JANUARY 1961

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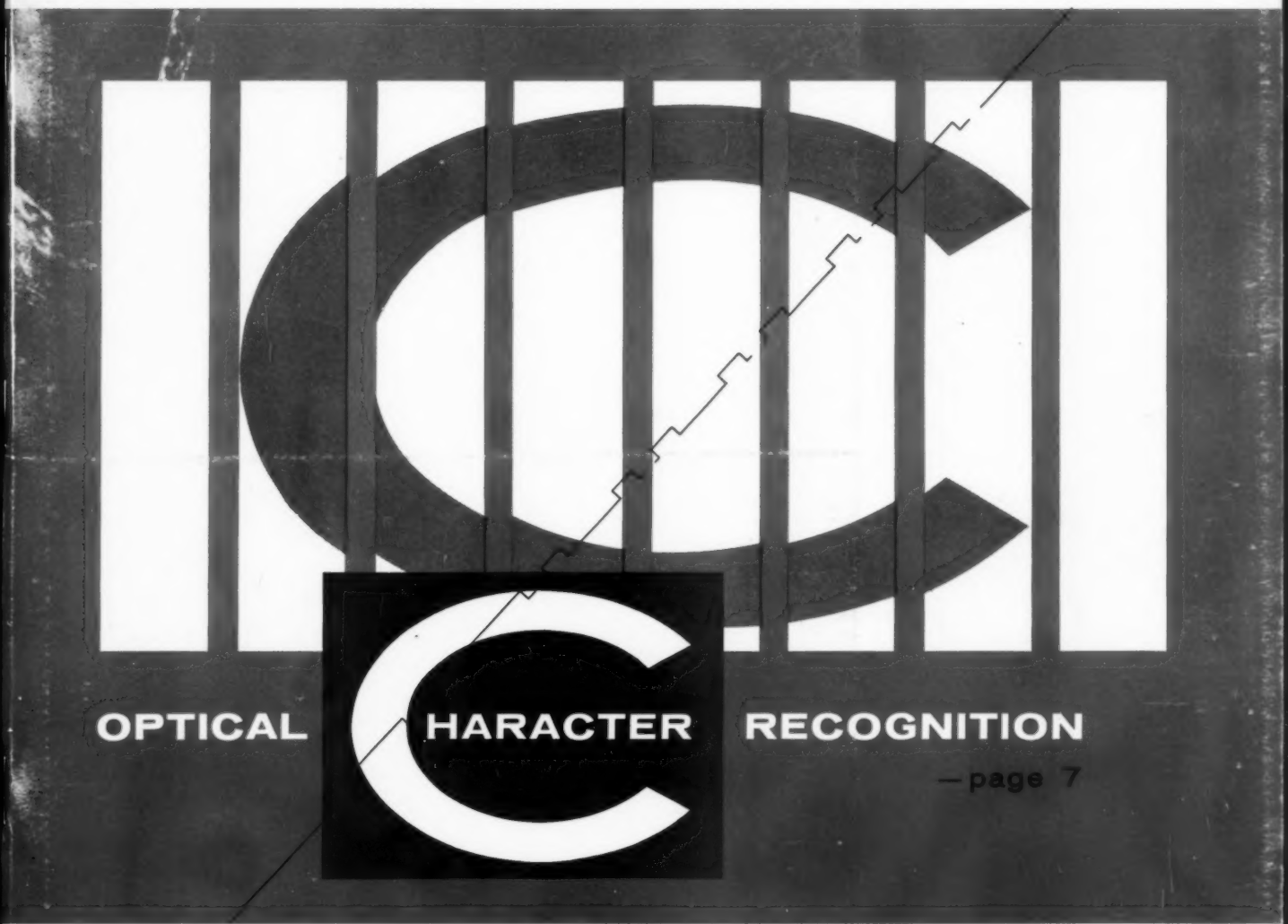
THE MAGAZINE OF AUTOMATIC OFFICE METHODS AND MANAGEMENT



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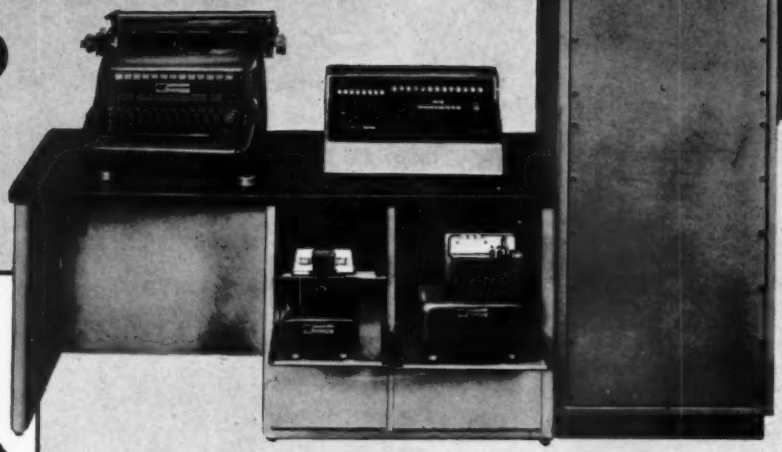

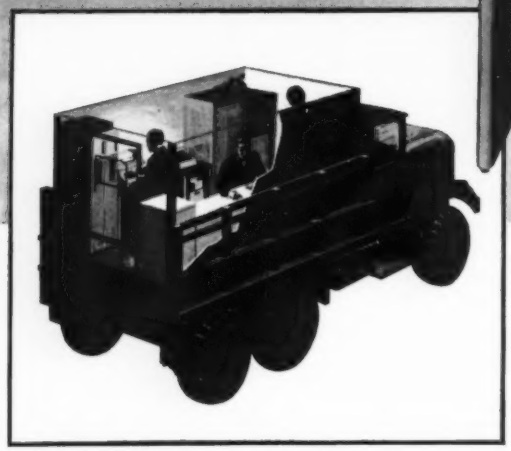

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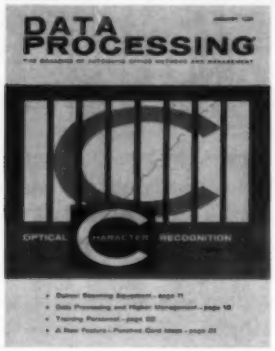

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OBSERVATIONS . . .

from the publisher . . .

DURING THE PAST DECADE data processing has been one of the most dynamic fields of activity. The most dramatic strides have been in the more sophisticated areas involving electronics and computing. But in terms of number of organizations affected, the use of punched card methods has been even more significant.

Ten years ago it is estimated that not more than 20,000 organizations had punched card equipment on their premises. Although actual figures are not available, estimates now run as high as 40,000 and some even higher. It is suggested that the use of punched cards in data processing has about doubled, especially when one considers the expanded use of equipment by those organizations which used it prior to the past decade.

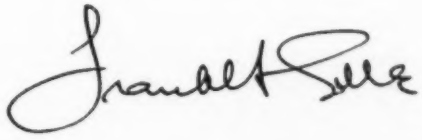
This growth is even more significant in effect when we consider that an organization must give considerable attention to systems planning prior to the decision to employ data processing equipment of any type. Therefore the accessibility of lower cost punched card units has unquestionably been a tremendous boon to the overall efficiency of business and institutional operations. And it provides the basis for even greater heights of office efficiency in the decade of the '60s.

One result of the rapid growth of data processing equipment and acceptance is the noticeable shortage of qualified personnel. This demand has challenged our public and private educational institutions to adapt their curriculum to provide courses in all phases of data processing. A decade ago virtually nothing was available in colleges or universities that could prepare a person for work in data processing. Seven years ago a few colleges could be found who offered courses in numerical analysis that could provide a limited background for work in the computing field. Only one of these colleges was equipped with a digital computing laboratory.

This situation has already been overcome to a large extent. We are now completing a survey of educational institutions offering data processing courses of any type and thus far we list 165 colleges and universities including a few junior colleges which give courses in this field. Many give extensive instruction and are equipped with laboratories or have equipment available for their students elsewhere. Some offer degrees either on the graduate or undergraduate level. There are extension and adult education classes offering both credit and non-credit courses in data processing and computing. And there are several good correspondence courses offered.

In addition to the offerings of academia there are private institutes and business schools in almost every section of the country which cater to the data processing field.

The results of this survey will be presented in Volume III of our Data Processing Annual scheduled for July, 1961. It will give complete details on all educational courses available, as a guide for readers. An interesting sidelight of this survey is the number of colleges which have responded and while they do not offer courses at the present time they do indicate that they intend to establish these courses within the next year or two.



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AUTHORS

VINCENT J. BRONSING *(Training Personnel)* has worked with data processing for over 16 years. He worked for Garwood Industries in 1944 until he went into the Armed Forces. While in the military he was a tabulating punched card specialist. After service he did railroading applications for the Grand Trunk line. He has also worked in automotive insurance, finance and loan and banking.

From 1951 to 1958 he worked at City Bank of Detroit, meanwhile completing graduate courses at the University of Michigan and the University of Minnesota.

In 1958 he opened Data processing Institute (now International Data Processing Institute) which has grown with branches in the middle west and in Montreal. Mr. Bronsing has been a member of the National Machine Accountants Association for the past eight years.

WELD S. CARTER, JR. (*Optical Character Recognition*) is a research physicist with the Burroughs Corporation Research Center. He was granted the AB degree by Columbia in 1950. For the past several years he has been engaged in techniques studies relevant to high-speed printing and to character recognition. Prior to that, his work was concerned with television cameras, systems, and related optical components and with a variety of military computer and control systems. Mr. Carter is a member of the Institute of Radio Engineers, with affiliations in their Professional Group on Information Theory, Professional Group on Circuit Theory, and Professional Group on Audio. He is also a member of the Society of Motion Picture and Television Engineers.

RICHARD W. DAYHUFF (*Data Processing and Higher Management*) graduated from the Uni-

versity of Utah with a B. S. in Industrial Management. He served four years in the Marines and is presently in the Marine Reserve as Captain (a data processing officer). He joined IBM in 1956 as data processing sales representative. In 1958 he became Director of Data Processing at Brigham Young University. He has done graduate work in Marketing and Accounting at Brigham Young University, and taught punched card accounting there. Mr. Dayhuff has had articles published in *College and University Business, ABStracts,* and in the *Data Processing Annual* for 1960.

WILLIAM A. McCOMB (*Medical Mailing*) is president of Fisher-Stevens Inc. This Clifton, New Jersey firm, established over forty years ago, has become one of the world's largest medical direct mail firms. ■

Comments

Continuous Forms Inquiry

Döffingen, West Germany

Dear Sirs:

For some time I have been regularly reading your magazine. Your articles are very good and I think very stimulating.

Since I specialize in the manufacturing of continuous forms I would like to ask you if it is at all possible for you to arrange an interchange of ideas in this field, especially with someone who is also manufacturing forms and who is producing the same at the present time.

Henri Baumeister
Engineer for the Graphical Trade

Ado about Forms

Lyndhurst, N. J.

Dear Sirs:

We are requesting permission to reprint the article "Much Ado about Something" by Ray Marien in your August 1960 issue of *Data Processing. . . .*

Richard E. McLaughlin
Bergen Business Forms

Permission given. Ed.

CONTROL AT **AMERICAN PRESIDENT**

James D. Short, Supervisor of Tabulating, American President Lines

"We did away with 300,000 postings!"

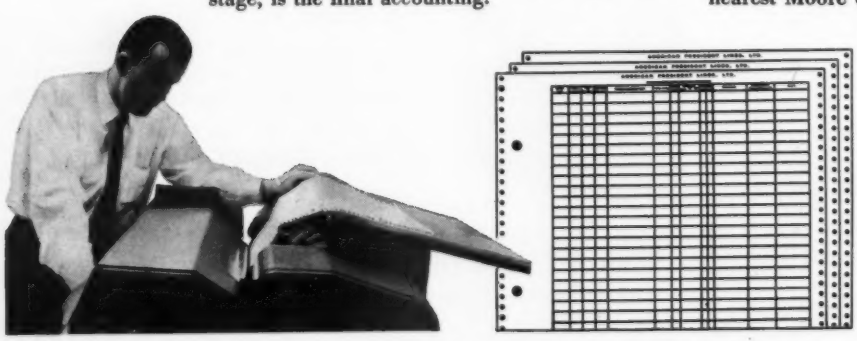
THE SETTING: American President Lines operates 30 cargoliners and 5 passenger liners. To make up voyage revenue and budget reports, the company collects and sifts mountains of data from scattered ports all over the world.

Reservations from 18 offices, 30 principal agents and thousands of travel agencies funnel into San Francisco headquarters every 24 hours. Facts in foreign weights, measures and currencies are converted to U. S. equivalents, summarized, and printed. The system also produces many other important reports.

THE SYSTEM: Data received is put on punched cards. An electronic accounting machine processes the cards, converting to U. S. standards, and prints the information on a daily summary sheet, an interim revenue report. This is revised daily as new figures come in and, in its final stage, is the final accounting.

After a ship has sailed, more incoming data is carded and radioed to sea. After a 120-day cruise, a budget report is run off, summarizing the vessel's performance—estimated vs. actual. A final budget report compiled in 10 days, as against 8 man-months, is the basis of management decisions on cargo matters, revenue volume, receipts and expenses, equipment needs, etc. The system speed-up resulted largely from eliminating 300,000 tedious manual postings a year—a crucial operating gain. The Moore forms in the system are the Line's control in print.

THE COUNSELORS: "We appreciate the system control and the help in forms design which the Moore man gave us," says James D. Short, Supervisor of Tabulating. For more details on how Moore may be able to help with *your* problems—no matter what kind or size of business—write the nearest Moore office. No obligation, of course.



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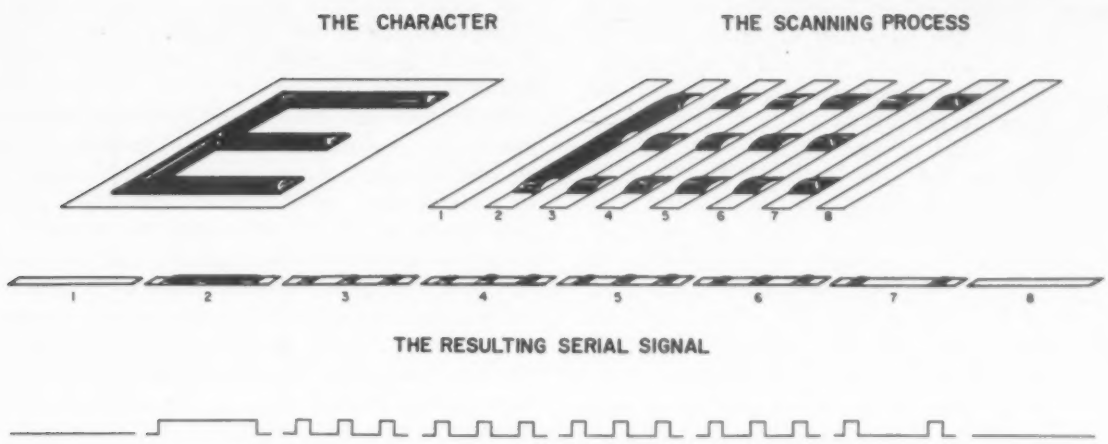


Optical Character Recognition

Can documents be read directly into a computer?

A RECENT INNOVATION in the field of automatic data processing is equipment capable of providing computer input signals directly from documents printed by ordinary business machines—typewriters and the like—without intervention of a manual key punch operation. Optical character recognition, the process performed by such equipment, is one of the basic steps presently being developed by the computer manufacturer as a means of improving communication between the user and computer.

Who needs it?

One might reasonably ask: *Why bother?* Equipment to perform this operation is not likely to be particularly inexpensive or simple. *Is it worth the trouble?* From among the many reasons that might be advanced for employing optical character recognition, we might mention here the following four. First of all, the data to be used in computation can be handled in a form that lends itself readily to spot checking, proof reading, and error correction by the user. In the same general category, we might consider the accessibility of intermediate memory from a computer for handling, for example, customer inquiries. In other words, given high-accuracy character recognition equipment, we could use, instead of the relatively inaccessible codes on magnetic tape, the text output of a high-speed printer as the means of storing computer results, account data and such, between computer runs. The advantages of this arrangement are probably even more obvious to the reader than to the author.

A second area of interest arises primarily in communication systems but is also relevant to some accounting operations. This has to do with the issue of responsibility for signed documents. Common alternatives to character recognition in these areas involve text accompanied by code; the text is for the human reader, editor or signer and the code for the machine. In such cases, the possibility is present for falsification of the code while the text is left valid, or for the correction of text in editing with the corresponding code correction for-

By Weld S. Carter, Jr.

gotten or erroneously done. The assignment of responsibility obviously presents problems.

The two remaining motivations for using optical character recognition are closely related. The one has to do with the reduction of errors and the other with the saving of manhours, both consequent on the elimination of manual operations presently employed in getting data into a form fit for computation. At the present time it is not uncommon practice for the same piece of data to pass through three sets of hands, one key punching and two verifying operations, in order to minimize costly errors in, for example, the scheduling of mill runs in a steel mill. In a typical installation of this sort, an error of one digit in an internal stock number code may mean the difference between placing a mill order for I-beams or for plate stock. The cost of an error here can be prodigious, and errors do creep in. Furthermore, the manual task is exacting and nervewracking, to the point where few clerks can stand it for as much as a year. This is just the sort of job the automation researcher can be proud to render obsolete.

We have, then, four good excuses for our interest in this area: accessibility, responsibility, accuracy and economy. As a bonus, we may be able to eliminate some particularly obnoxious kinds of job requirements.

How is it done?

If, then, it is agreed that we need to do so, how can we ask a machine to perform optical character recognition? For the purposes of this article, let us consider the process as divided into three steps—signal-pickup or *sensing*, signal-processing or *standardizing*, and the *decision* process.

The first of these steps is commonly spoken of as being performed by a scanner, a device conceptually similar to a television camera used in the broadcast studio. The process performed by the scanner may be conceived of with reference to the figure. Some sort of detection device capable of having different responses to different amounts of light *takes a look at* one spot after another of the space in which the character is printed, looking down one column, then down the next, and the next, until it has looked at all the space involved. It is as if the character were cut up into strips and these strips were laid end-to-end; the signal that is generated is a measure of how much ink was found at each point along the set of strips. So far, what we have done is not materially different from what takes place in a television camera or, for that matter, in a facsimile scanner of the sort sometimes used for transmitting telegrams.

The next step, too, has its counterpart in broadcast and in facsimile. The signal is submitted to specialized electronic equipment which converts it into a standard form. The purpose of this standardization is to minimize the effects of different lighting intensities, different weights of printing, smudging, and all the other manifold variations that afflict ordinary printed or typed documents. Though not all of the variations can be corrected in such a manner, much improvement can often be achieved.

We've said that both of the processes mentioned above, the sensing or scanning process and the standardization process, have direct counterparts in systems that are concerned with the transmission of images. It is only when we come to the third process, the decision phase, that we find an essential difference. In this stage of a character recognition system, the standardized signal is evaluated according to some set of rules or criteria: the output of this evaluation must be a decision as to which of the possible input characters was most likely to have given rise to the signal just encountered.

The decision process has two interesting properties that might be mentioned here. It is discontinuous, and it reduces drastically the amount of data in a signal. To say it is discontinuous is to say that a small change in the input signal (*slight distortions in letter shape or ink intensity, for example*) either produces no change in the output decision or it produces a jump to the decision for some other character or for the *can't read* signal. The reduction in the amount of data is suggested by the foregoing; the output contains the report on what letter or number was found but not all the details of shape and type font, or of deformations and smudges.

Once such a decision has been reached the output of the decision unit can be coded in whatever form is convenient for the particular application and installation. The output might be punched paper tape for one application, magnetic tape for another, and in a communication system it might be five-level or six-level teletype code or fieldata[1]. It might even be internal computer code for direct communication with a computer's high-speed memory.

A criterion — a trial query

To make clear the distinction between pattern-transmission systems such as television and facsimile, and decision systems such as optical character recognition equipment, it might be convenient to have resort to a simple trial query: What difference would it make to the system under discussion whether you asked it to handle a weather map or typewritten characters, whether you asked it to operate upon adding machine tape or matter

[1] Fieldata — a family of codes for use within military computers and, also, in an abbreviated form, for data transmission between computers and for ordinary communication in related military systems.

printed in Cyrillic (*Russian*) or Chinese characters? As we shall see in a moment, most of the systems that perform what we would want to call character recognition would be stumped by the Cyrillic or the Chinese patterns. All of them would suffer indigestion on a weather map. On the other hand, none of these various input patterns would present any particular difficulty to a television scanner or a facsimile system.

A matter of design philosophy

A number of firms and university laboratories are conducting investigations into various aspects of the problem of character recognition and the more general problem of pattern recognition. Two fundamentally different kinds of investigations have evolved. In the one, the equipment designer undertakes the task of selecting a collection of properties or tests which are regarded as descriptive of each of the set of shapes to be recognized and which lend themselves to machine use; in the other, he assigns the machine itself the task of finding these properties.

In the first kind of machine we have what we might call a deterministic design. What we mean by this is that the machine designer selects a particular set of shapes that his machine is to recognize, perhaps the upper-case alphabet and the numerals in some particular type font, and then makes a set of choices concerning the properties of these shapes for which the machine is to test. These choices may be based on intuition or on statistics collected on a prototype machine. It doesn't matter on what they are based; the relevant point is that, in some way, the tests to be performed are chosen by the designer. Any pattern which meets the tests imposed for the letter "Q," then, the machine is to identify as a "Q."

In the latter class of device, the designer constructs a system intended to modify its performance and output in response to all of its past history of input signals. The machine is then exposed to a large number of samples of different letters and numbers in a preliminary *learning* phase. The machine will itself determine what characteristics are in common among all of those inputs that were identified by the *teacher* as a "Q."[2] In this case the designer may never have occasion to know what criterion the machine employed. In fact, one of the motivations impelling some laboratories to an investigation of this class of machine is the suspicion that the problem of deterministic design for a general-purpose character recognizer may be too complex to be handled in any other way. This is not to say that machines capable of recognizing a single type-font or even a group of similar fonts might prove to be this difficult; it is to suggest that the *any font* problem and the hand-lettered character problem may well yield to a learning-machine approach before the deterministic designer has gotten there.

Comparing these two approaches with regard to the criterion offered earlier, we can see that machines of deterministic design will generally recognize only characters similar to these for which the designer provided capability. Learning machines, on the other hand, appear to offer an almost equally good prospect for handling Cyrillic or other strange (*to us*) type fonts, provided only that the total number of distinct symbols to be recognized doesn't exceed the memory capacity of the learning device. Clearly, a machine that could handle Roman characters such as we use, or Cyrillic characters, might well break its back in attempting to manage Chinese ideographs; there are thousands of the latter to learn, practically one for each word to be reported. A learning machine could be taught to handle these; however, it would have to be a larger-scale device than those needed for fonts with fewer characters.

Character recognition machines of today

Most of what has been written above describes character recognition equipment as if the availability of practical machines lay entirely in the future. This is obviously not so. Several classes of machines performing the task of which we speak are presently being marketed by a number of firms, both in this country and abroad. However, it is fair to say that, compared with the general purpose equipment discussed above, what is available today is equipment tailored to very specific ends. These ends may well be fulfilled better by some of today's special-purpose machines than by the general purpose ones of the immediate future.

The American Banking Association has adopted a magnetic ink character recognition (*MICR*) program for encoding, sorting and computing with the various kinds of data normally carried on deposit slips, checks, and similar customer-created documents.

The check-sorting problem has a number of special requirements. For one thing, the same check is likely to go through sorting operations in a large number of different institutions in the course of being cleared from the bank in which it was deposited to the bank against which it is drawn. In the second place, as mentioned above, an appreciable part of the relevant data on the document is put on by an outside customer. In the third place, the accuracy requirements are considerably more stringent than might be encountered in a great many other applications. All of these, taken to-

[2] Some machines of this sort are conceived of as having the *teaching* process cease when acceptable performance has been achieved. Others, behaving more like a competent clerk, would continue their learning processes throughout their period of usefulness.

gether, justify the economics of special imprinting processes, with very rigid printing tolerances, as the means for marking the check with data that is to be legible both to machine and to human reader.

In this system, we have not eliminated the human mediation, the entry by an operator into a manual keyboard of the data to be encoded. What we have done is to make the encoded data just as easy for the customer to check as it is for the machine to read; in addition, we have required this human intervention only with regard to the variable data on the document, and then only the first time the check enters a bank participating in the MICR system. The fixed data with regard to any given account—that is to say, the identity of the bank in which the account exists, the account number, and a code identification of the fact that the document under discussion is a check and not a deposit slip, for example—all are entered on entire books of checks by a printer before the checks are issued to the customer.

We have in the foregoing example reduced, but not eliminated, human mediation. We have required a special imprinting process with stringent tolerances. We have achieved with this a document capable of withstanding a considerable degree of mutilation and abuse, and an outstanding degree of system accuracy. Our general purpose machine of tomorrow may well, at least in the immediate future, fall a little short of the accuracy specifications imposed for the above example.

How is system typical?

We have described in some detail one particular character recognition system that is now coming into widespread use. At the beginning of the description I characterized this as a typical example. We might well ask at this point: In what respect is it typical? The answer is to be found in two features, at least one of which will be found in each of today's machines. The first is a restriction on type font, and the second is a restriction upon printing tolerances, and especially upon registration. Not all contemporary machines are single-font machines but the machine that will run up a practicable record of accuracy in reading documents not especially prepared for its use is not to be found on today's market.

Note well that the requirement that imprinting be done to special tolerances commonly implies that we have not entirely eliminated the manual keyboard operation as the means of preparing data for computation. What we have eliminated is the need for keyboard verifying; proofreading can become a simple matter of reading text. Also, we can often generate the required printing as a by-product of a keyboard operation that serves some other purpose in the data processing system. An example would be the use of tape from an adding machine or cash register. Even if the tape printing components required special adjustment, the result might be a simpler system than one using, for example, auxiliary tape punches at each register to generate computer input data.

The next few years are likely to see a continuing emphasis upon machines intended to read documents prepared especially for their use. In fact, a standards group has been established by the OEMI *(Office Equipment Manufacturer's Institute)* for the specific purpose of helping insure that special font equipment, built by a variety of manufacturers, stands a good chance of being capable of reading documents prepared upon printing equipmment built by other manufacturers.

Several papers have been written recently about testing various character recognition methods on general-purpose computers. This may well raise in the minds of the reader the hope of being able to perform the work described above as the decision process in the general-purpose computer he already operates. Unfortunately, most of the programs offered to date have required computer running times ranging from five seconds to twenty minutes for each character to be recognized. Such running times are not excessive for the research purposes for which the programs were contrived, but they would be prohibitive for most data processing applications.

What we have here is a considerable disparity between the kind of organization exhibited by the character recognition problem and that commonly found in general-purpose computers. Most general-purpose machines are particularly well suited to sequential problems. Most approaches to character recognition have required a very substantially parallel organization. The problem that results from this disparity may yet yield compromises of interest, but they will be compromises.

What of the future?

The requirement for stringent printing tolerances may be said to be the principal limitation of machines available on today's market and of most of those that are currently on production drawing boards. Work is presently in progress at the research level that should first mitigate and ultimately eliminate this necessity. In a field in which prediction is a fairly hazardous undertaking, I'll venture the opinion that the next five years will see at least the construction of prototypes, and perhaps the application by the customer, of machines capable of handling material imprinted by ordinary business machines without special adjustments. In short, we can expect machines of the not-too-distant future to handle the documents that are being created today, in your offices, rather than requiring those prepared especially for machine processing. ■

Optical Scanning Equipment

The machines of today show the direction of development for the next several years.

By John H. DeJong

IN THE NEW COMPUTER CENTER of the Atlantic City Electric Company in New Jersey, paid-bill stubs whiz by the sharp eye of an optical scanner, which punches out on tape the customers' numbers and the amounts of the payments. American Telephone and Telegraph uses optical scanners to inspect its computer-prepared dividend checks and to punch amounts and certificate numbers in the checks. Here are two of the several dozen applications that have already called upon the new electronic readers to prepare computer input or process computer output.

The past decade

The invention of the optical scanner is credited to David H. Shepard of Arlington, Virginia. In 1950 he and a friend, Harvey Cook, Jr., started working on a machine that would recognize printed figures. By 1952, they had developed a machine capable of identifying the complete alphabet as produced by a standard typewriter. Mr. Shepard patented the machine and formed a company to handle the manufacturing, the Intelligent Machines Research Corporation. The first I.M.R. machine was sold in 1954 to the Farrington Manufacturing Company, a Massachusetts firm which owns the Charga-Plate service and a pioneer in the credit identification field. Farrington purchased almost all of I.M.R.'s optical scanners for lease to its customers, and in 1959, bought out the entire I.M.R. and made Mr. Shepard the Farrington vice president.

Farrington has had the field almost entirely to itself until now, but a number of companies have indicated that there will be plenty of competition in the near future. RCA, IBM, National Cash Register Co., Addressograph-Multigraph, and National Data Processing of Dallas have all started making scanning equipment.

What's being offered

The scanners available today have many limitations. Some create punched cards, some punched tape, and others go directly into computers. Every one has severe restrictions on what can be read; each scanner has one or possibly two type fonts which are acceptable, and few machines have any provision for reading alphabetic information. Some can read only one or two lines from a document in a single pass. The formats which can be handled are often very closely defined. The chances are slim that any company could use an optical scanner on its own documents without at least a new design of forms; in each of the current applica-

tions, the work has been tailored to fit the scanner.

One of the most versatile scanners on today's market is the Farrington 10DP2. It can read both upper and lower case letters in a particular type font, common punctuation marks, and Selfchek* numerals, the stylized numbers found on many oil company credit cards. The EYE, as Farrington calls it, can read an entire page, or can be programmed to take only part of the page. Output is a paper tape, punched in either five-level or six-level code. Other Farrington scanners read only Selfchek* numbers and punch them in cards or paper tape.

IBM has announced the 1418 optical character reader which accepts two kinds of numeric type fonts as input, the conventional 407 font and an elongated type which can be put on the 407. Information can be read from at most two lines, and each field read must be identified by field marks. Optional equipment on the 1418 allows mark-reading, similar to mark-sensing but not requiring conductive marks. The information read by the 1418 is available as direct input to the IBM 1401 data processing system.

National Cash Register has designed a relatively small processing system which optically scans cash register tapes and summarizes what it reads. The National idea is a sound one, for the processing of punched paper tapes attached to registers has been costly and not too neat; in addition, the summarization which the scanning unit performs may significantly reduce the cost of data processing in retail stores. The cash register print wheels must be changed to conform with the self-checking style used by National, but this relatively small change is all that is needed to make the input acceptable.

What applications?

The major oil companies have thus far been the principal users of optical scanning equipment. Scanners read the customer numbers from the credit-card invoice tickets and punch them into the tickets; conventional methods are used to complete the monthly billing process. This type of operation will undoubtedly get wide use in other credit billing and accounting applications. It seems logical that in the near future, the amount of the sale will also be printed in machine-readable characters, and no manual operations will be required in the billing cycle.

Utilities offer a similar opportunity for the use of scanners; in several, already, the computer-output billing card is entered into the system when it is returned with payment. Only when partial payments are made is there a necessity for manual intervention in the process. In each of these applications, one scanner can keep up with twenty or more key punch operators, doing its own verifying as it goes along. Retail stores may be most affected by optical scanners since the new equipment may make data processing economically worthwhile for them. Several department stores have started programs using sales slips and cash register tapes to control inventories. No attempt is being made to keep track of sizes and colors of items sold, but price and classification of merchandise on each sale gives a computer a pretty fair idea of what needs to be reordered and what isn't selling.

Manufacturing organizations have a wide variety of possible uses for scanning equipment. At least one company is using an optical scanner to enter sales information directly from invoices into punched cards. Clock cards may soon be handled completely automatically. In many applications it costs less to punch using a scanner than to send punched cards through an interpreter to get the same result.

It seems safe to assume that the biggest user of computers, the United States Government, will be the biggest user of optical scanning equipment. Several special-purpose units have already been put into government use, and many others are on the way. One reads entire typewritten pages at 1800 words a minute, and readies the information for teletype transmission. The Post Office Department is testing a machine which will sort letters to forty destinations; this machine accepts a wide variety of type fonts, and could properly sort certain handwritten addresses.

The next decade

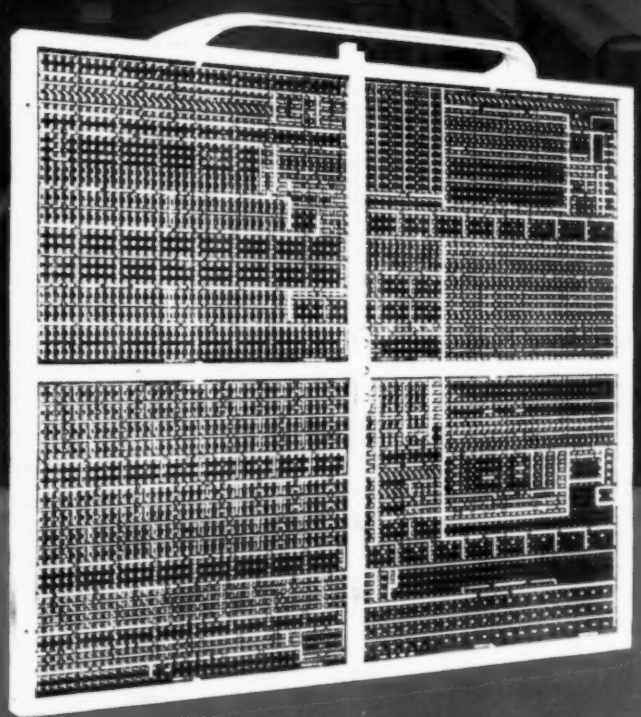
Without much doubt, we can say that optical scanners will become much better and much more widely used in the near future. The manner in which prospective producers have rushed into this new field indicates that one should be able to choose from a large number of machines and find one which fits his application well.

Many of today's limitations, however, will still be found in most machines of the sixties; type fonts will be extremely limited, although not so much as at present; documents will still have to be prepared with the scanner in mind. There may be machines which will read almost anything, even handwriting, but these will be giant computers in themselves, and will be much too slow and expensive for any business application.

No one expects the optical scanner to eliminate the key punch machine, but in many applications it will replace it, at a considerable saving of time and money. And in at least one area, retailing, the optical scanner may be the key needed to open the door to modern data processing methods. ■

*Registered trade mark.

ACCURACY, DEPENDABILITY and ECONOMY



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NEWS SUMMARY

GENERAL

Electronic Accounting Card Corporation announced that net profits for fiscal year ending September 30, 1960 increased from $102,906.86 to $167,983.15.

Financial reports

Electronic Engineering Company of California totaled $192,000 net income for third quarter of 1960; cumulative earnings for the nine months were 42 cents a share.

Friden, Inc. reported net profit for nine-month period as $4,018,845, up 71 per cent from previous year for that period, with sales up 26 per cent. $3.44 a share dividend compared to $2.04. Friden stockholders approved a three-for-one stock split. Authorized capital approved increased from 1½ million shares at $1.00 par to five million shares with par value of 33⅓ cents.

C-E-I-R, Inc. is merging with DATA-TECH Corp., of Connecticut, a company specializing in electronic data processing services for the New England area. This is C-E-I-R's third merger in five months.

American Business Systems, Inc. earned a record high sales of $2,583,000 for the first three-quarters of 1960 for a net income of $93,000.

Litton Industries, for quarter ending Oct. 31, increased their sales by $15,676,000 over same period of previous year, a 43 per cent increase in sales and 40 per cent increase in net earnings.

NEW APPLICATIONS

E. F. Hutton & Co., one of the nation's largest stock brokerage houses, is planning to install an RCA 501 system for electronically processing increased paperwork required for large volume *stock, bond and commodity business.* Hutton has been using a service bureau.

Computer used in directory delivery

The New York Telephone Company is using an electronic data processing system to increase accuracy and efficiency in the delivery of nine million telephone books in New York City and suburbs. The operation started with the Yellow Pages, in Manhattan, and will continue for the next year. Use of the RCA 501 system permits rapid *updating of customer delivery files* and enables the directory department of the phone company to make delivery order changes.

MILITARY

Telephone-telegraph network

RCA Service Company assumed full operation of *White Alice,* the communications network connecting the principal cities and military bases in Alaska. *White Alice* is a network of radio, microwave, cable and long-line communications, much of which utilizes transmission known as forward propagation tropospheric scatter—in which signals are bounced off the upper atmosphere to reach beyond the horizon, the only means of providing telephone-telegraph system in rugged terrain.

The Navy awarded a $26 million follow-on contract to the Bendix Corporation for continued development and evaluation of the *Eagle missile system.* This will be under the management of the Bendix Systems division, Ann Arbor, Mich., the prime contractor. ■

By William A. McComb

APPLICATION OF THE MONTH

Medical Mailing

One million pieces of direct mail can be processed per day — with this system utilizing punched cards, paper tape and Addressograph plates.

THE LATEST electronic data processing and mailing equipment has enabled Fisher - Stevens, Inc. to achieve its primary objective — fast, dependable mailings of literature to the medical profession for the pharmaceutical industry.

Where does direct mail fit into the medical picture? The answer may be found in the pharmaceutical field itself, an unusual industry where neither buyer nor seller has much influence on the acceptance of the product. The physician, with his control over ethical drug prescriptions, holds the key to drug sales.

But, to reach and influence the physician with information about its new products, the pharmaceutical industry cannot advertise profitably in the regular mass media: newspapers, radio, television, and general publications, since only a small percentage of the general public are medical men.

The pharmaceutical firm, however, has three other ways of contacting the physician. First, there are salesmen, called detail men, who will call in person at doctors' offices. Second, there are trade publications and medical journals. Third—and most important—is direct mail.

The importance of direct mail may be dramatized by considering that information about new breakthroughs in medicine or new dosages must be supplied to the physician immediately. The largest detail force would take months to make personal calls on all physicians, and magazine deadlines are often weeks away.

Direct mail, however, puts vital information in the physicians' hands in the shortest possible time.

At Fisher-Stevens, we consider our contribution to this flow of medical information to be a serious responsibility. To this end, we constantly study new developments in the electronics industry to determine if they can be turned into speedier, more efficient procedures.

Vital to our operations are our mailing lists containing more than 600,000 different entries—physicians, osteopaths, dentists, nurses, veterinarians, drug stores, hospitals, etc., — all listed in geographic-alphabetic sequence.

A record card is maintained for every practitioner, showing such information as name, address, county, birth date, specialty, and special company codes. A staff of more than 35 researchers puts over 5,000 hours a month into checking and developing information and making an average of 15,000 changes and additions. Information is gleaned from detail men's reports, telephone books, directories of practitioners and specialists, and special reports from pharmaceutical and ethical drug manufacturers.

(continued on next page)

IBM 407 accounting machine with address writing feature creates a reverse carbon image on paper tape at the rate of 9,000 three-line addresses an hour.

Punched cards created

From each record card we create two punched cards—a name and address card and a statistical card. The statistical card, keyed to the name and address card by number, contains year of birth and age group code, year of graduation, specialty, association memberships, state, population group code, etc. If required, we can even include information on a physician's magazine subscriptions and the number of samples he desires.

The two types of punched cards serve a dual purpose. First, they may be processed through an IBM 407 accounting machine equipped with address writing feature which creates a reverse carbon image on a paper tape at the rate of 9,000 three-line addresses an hour. This imaged reel of master tape is placed in an Addressograph-Multigraph transfer printer, which heat-transfers the name and address directly to the mailing envelopes or other materials.

Second, a six-channel punched tape is created by running the punched cards through an IBM 63 card-controlled tape punch. This tape is then used with an Addressograph-Multigraph Graphotype 6700 machine to produce Addressograph plates automatically. At present, we have about 2,000,000 of these plates on file.

Also, various types of statistical information are taken from the statistical punched cards on an IBM 101 electronic statistical machine. These are published in book form for the benefit of our customers. Other special reports are prepared as requested—detail counts for sales surveys; counts to determine printing requirements for literature; and up-to-date name and address lists.

This, then, is the system described in its simplest terms. While the machines mentioned are primarily responsible for the efficiency of our operation, the post office requires that each bundle of third-class mail for a specific town be separated and tied. Formerly, the separation into towns had to be accomplished manually.

The reverse carbon image paper tape created by the IBM 407 accounting machine is used in an Addressograph-Multigraph transfer printer. Names and addresses are heat-transferred directly to envelopes or other mailing material.

Using the six-channel tape created by the card-controlled tape punch, an Addressograph machine automatically turns out plates.

Automatic separation for mailing

Now, the 407 automatically prints a symbol on the address strip, indicating the separation between towns. An electric eye in the Addressograph machine reads the symbol and accelerates the conveyor carrying the literature, providing physical separation between the mail for one town and that for the next.

Another "custom" aspect of our system is the six-channel tape we create on the card-controlled tape punch. A regular tape has five-channels. However, we needed a method which would give us upper and lower case characters for the addresses. IBM modified the basic 63 machine to give six channels, the extra channel being used to key the Addressograph machine for upper and lower case.

The Addressograph plates for physicians contain specialty keys and age data. On a pre-addressed order card it is possible for our customers to tabulate replies to a promotion campaign, since the tab and key information appears in printed, coded form.

Using returned order cards, a customer can establish characteristics for a prime market—specialty, age group, state, and size of town or city. From this information it is possible to eliminate

secondary or marginal groups and concentrate on those that offer the best return.

Selection of groups

From both punched cards and plates we make automatic selections of special groups as requested by customers. For example, a pharmaceutical firm might want to reach all pediatricians under 65 years of age in towns of 7,000 population or more. If the material to be mailed is to receive heat-transfer addressing, we collate and sort out the two sets of punched cards to give us a card deck containing only the described physicians. With the Addressograph plates, code tabs inserted in the frame of the plate enable the Addressograph machine to select the appropriate plates automatically.

In addition to the machines already noted, we use an IBM 403 accounting machine and a 108 card proving machine, with a normal complement of card punches, sorters and reproducers. And, we have over one hundred Addressograph-Multigraph machines of various types.

With these machines, plus inserting, sealing, binding and other direct mail accessory equipment, we can process 1,000,000 pieces of mail per day.

Our ability to process this tremendous volume of direct mail depends on the electronic mailing systems described here which provide fast, accurate mailings to a great volume of names in a large variety of categories.

In some instances, Fisher-Stevens uses Addressograph plates for mailing. Here, an operator converts name and address punched cards to six-channel paper tape, which is used to create the Addressograph plates. The card-controlled tape punch shown here normally turns out a five-channel tape. IBM added a sixth channel to give upper and lower case characters for addresses.

Data Processing and Higher Management

Data processing managers — "En Garde"

IN MANY ORGANIZATIONS, there tends to be a wide gulf between the management of the data processing department and the next higher level of management. This separation is one of necessity. It is caused by the highly technical knowledge required to manage data processing. The higher level manager does not normally have time to study the field enough to be more than a conversationalist in the subject. Rather, personnel and fiscal matters get most of his attention.

In many cases, the data processing manager finds himself in a vacuum of contact with company policy. In fact, there is often no written policy on the data processing department operations to which the manager can turn for guidance. If this is the case, the data processing manager is left open to serious errors, depending on the person to whom he reports.

Ill-defined or missing policies often indicate a reluctance on the part of the responsible executives to commit themselves. By maintaining policy in an ephemeral state they can adroitly side step the blame for error, claiming that "they did not approve of that before it was done."

General types of non-policy operators

Non-committal silence on the part of a higher manager on policy questions or on suggestions for action cover weakness, an indecisive personality, or a fear that his own decisions will be reversed. An organization with the latter sword of Damocles will not have an effective written delineation of authority for its high executives. We can define several general types of these men who operate without policy:

1. The rugged individualist. He flies the outfit by nerve, strength, and instinct. This man is rare, not very amenable to change, and is apparently leaving the American business scene.

2. The man none can blame. If someone complains to this fellow about one of his underlings, he can always say he did not approve of the action before it was taken, and therefore cannot be blamed for bad results. He will not put an OK in writing unless another person or two sign the same letter. This leaves him out of any hassle which may develop. His favorite phrase after giving a verbal go-ahead to an ambitious junior is "Good Luck." This neatly divorces him from further participation in the project, puts the entire responsibility on the subordinate, and gives a thin gloss of executive backing to the project.

3. The fount of all rumors. Rumors, comments, and criticisms are all too frequent against new managers in the middle levels. This executive tends to take credence from anonymous attacks, and will often present such attacks as facts, that

By Richard W. Dayhuff

he has, to his horror, just learned. If an actual informant is involved, he most often refuses to say who it is.

Suggestions for new group manager

It looks hopeless for the defense under these conditions, but there are some fairly good moves to make in retaliation and defense. Provided you have been placed in charge of a group, or have been offered the job, some suggestions for short range plans are:

1. Make a written appraisal, or job description and get it approved. This will greatly help on questions of authority.

2. Do not ask for opinions too frequently. Take the attitude that you should never ask questions to which you do not want to receive an answer. This type of action, or lack of it, will build the idea that you are a strong administrator who does not need extra help constantly.

3. Move ahead and operate. Make decisions. Take action. However, you should always be prepared to defend yourself. Have a complete plan prepared. Schedule the work for yourself as well as for your employees.

4. When asking permission or suggesting a course of action, make it evident that you will accept silence as assent. Be careful with this one. It can backfire on you, since it is so obvious a dig at indecision. It may help to cut down on the number of "lost" memoranda which seem to disappear on desks of bosses.

5. In the event of anonymous attacks or rumors, a vigorous, loud defense will make the rumor-handler back down. The rumor merchant ("I understand," or "they say") usually cannot or will not prove a rumor, while the person attacked has every chance to defend with facts.

Long-range solutions to operating problems under erratic high level leadership are those which are generally expected from a good installation. Written policies for your own department, written job descriptions, and the other control methods peculiar to data processing will all be helpful in giving better service to the organization.

The infighting among middle managers *(data processing managers are usually in this class)* is often most vicious. Frantic jockeying for position for promotion can rob a job of its satisfactions and rewards, over an extended period. At the same time, such bickering is casting the men involved in the molds they fit for the future. The strong will survive for promotion, the weak will change jobs or pull back from the fight and be passed over. You cannot ignore any criticism or attack. You can be prepared for defense, or better, counterattack, by learning early the position you must maintain in relations with your own higher management. ■

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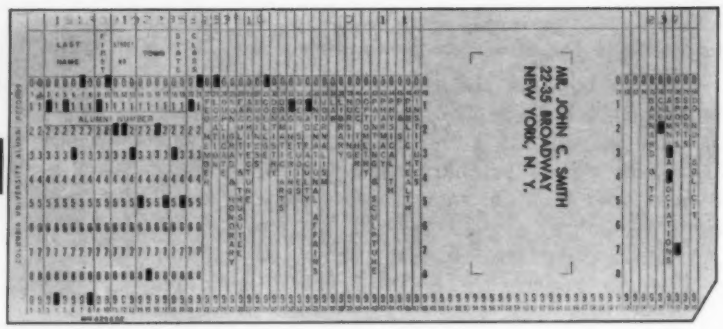
each customer's profile . . .

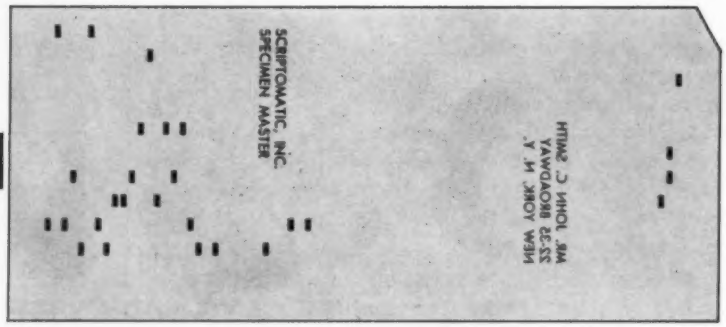


Any punched or plain card becomes a Scriptomatic Master

Front

Back

an address card master . . .



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Scriptomatic represents the "perfect marriage of punch card records and addressing equipment". No other addressing and data writing system permits such versatility *and* economy for production operations—and there's a Scriptomatic model designed for your specific needs. Write today for detailed data, and case histories in your field.

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RAY MARIEN

–A Monthly Feature **Marien on FORMS**

For Want of a Form . . .

IT SEEMS TO BE TRADITIONAL in the business forms field for the requisitioner to insist that he needs his supply of forms *yesterday*. Actually, there *are* two situations where rush delivery is understandable.

The first situation occurs when a new system goes into effect and brand new forms are required. Everyone is anxious to get started, to break in the new paperwork flow properly, to save *large sums* of money for the company with the streamlined procedure. All they need to get going, of course, is the supply of new forms. For want of the form, the procedure change must wait.

Some people are quick to scoff at this. They point out that it took months, perhaps even *years*, to *change* the procedure. Why, then, the sudden *rush* for forms? If they waited that long, can't they wait a few months more?

Obviously, they *can't*. The best reason for the rush is that they have spent enough money instituting the procedure change. The longer it takes, the costlier it becomes. Therefore, every day that passes *now*, while they await delivery of the forms, is a costly one. Also, there is the human element to consider. Did your wife ever spend weeks shopping for the *right* dress, and then, when she finally found it, put it away in the closet and waited patiently for an occasion to wear it? Heck no! It might have taken *weeks* to find, but once she bought it, she'd find the occasion to wear it as quickly as she could! That's human nature. The wait only builds up our appetite for the fulfillment.

Unexpected depletion

The second situation where rush delivery is *not* the fault of the requisitioner, is far more critical. This occurs when you *run out* of forms *unexpectedly*. Please notice that last word, *unexpectedly*. That's the key to the situation. It means that *despite* good inventory methods you still get caught with your forms down. Need I spell out the seriousness of a situation when an insurance company runs out of policies? Or a bank out of deposit slips? Or when *any* company runs out of invoices? Perhaps, if I put it more personally, the point will be made more strongly. What would *you* do if your company couldn't turn over your pay check to you on payday because they ran out of blank checks? All these things *have* happened, and to *many* companies. Usually, they find some way to get substitute forms to do the job, to fill the need until a fresh supply of the standard forms can be had. Aside from being frustrating and costly, this kind of situation can really give your corporate image a black eye!

I said before that this can occur *despite* good inventory control. Here is an example: Your company sells a consumer line of products, in a hotly competitive field, say the food line. All of a sudden they come up with a red-hot item. It's a *bombshell*. It should blast open the world of breakfast foods! You begin selling it like crazy, as fast as your factory can make it, box it and ship it out, because you realize that you're in a rough business. Your competitors will have "something like it" on the market as quickly as they can copy it, or imitate it, *legally*.

Man, oh man! You are really sending a jet stream of the new product off your assembly line — breaking all production records! Then — with a jarring sound that hits the forms control analyst's ears like a sonic boom — the production stops, or at least the *shipments* stop. Why? Because *you've run out of bills of lading!* Whose fault is it? The forms man? Gosh, no! He only received the requisition three days ago and the specs are already through purchasing and out for bids. The stock clerk? Again, no! Shipping wiped out his complete supply in a *week*—a stock of bills of lading that normally lasted *six months*. It happened *too fast*. His order went to forms control the minute his supply began to plummet down.

Was it the shipping foreman's fault? Still not guilty. Did *he* know they'd have to ship out that tremendous number in such a short time? Of course not!

Business just too good

I could trace this on and on — but I believe you see the real culprit. The consumer *alone* was responsible. He liked the item and bought it up as fast as it came out. Which was far faster than the forms essential to production, shipping and invoicing could be ordered, printed and received. A *happy* situation from the sales point of view but it led to a *critical*, sad situation at the shipping end of the production line. Naturally, matters do not stop there. Rush orders for forms are sped through, printer's presses grind away 24 hours a day and air express shipments get the forms to the shipping department with the least possible delay.

But it doesn't remedy the basic cause of the jam-up. It costs the company a premium price for forms which they are only too happy to pay, of course, but it was still *unavoidable*, in view of the circumstances.

The answer? Either go overboard on your supplies of critical forms and order a six years' stock *(even that may not be enough for a "really big" item!)* or fire your entire research department and stop developing newer, better products. Both of these suggestions are too silly to merit any consideration at all. So you are left with the problem. It has happened before and it will happen again. For want of a form . . . ■

By V. J. Bronsing

Training Personnel

Private school organized to fill data processing personnel needs.

MANY SUPERVISORS AND DATA PROCESSING MANAGERS have wondered why they could not hire adequately trained personnel. The fact is that they could hire such people if they could afford to pay for them. As the demand expanded the supply became scarcer, and the cost went up competitively.

Because of the need, one group of punched card supervisors, managers, and system-analysts got together in a private undertaking to properly train selected personnel.

Planning training school

The first step of the training program plan was to decide on a method of teaching to cover a curriculum that not only included machine technology and wiring but also a variety of applications such as payroll, billing, labor distribution, sales analysis, banking procedures, inventory control, and the like.

Choosing a staff required many interviews with men from the field of data processing. Some had adequate knowledge but would not make good instructors since they could not impart this knowledge to others nor perceive when the material was being absorbed.

Those finally selected as teachers were taught the use of visual aids and teaching techniques to meet classroom situations, and related teaching methods. The training was done by lecture, film, and discussion. Curriculum analysis determined that this plan would be used as a guide for minimum instruction; there would be no maximum. The only restriction on class training would be the ability of that class to absorb the material.

To spice the program and satisfy data processing managers in the field, the tricks of the trade which divide the good operators from the poor ones were included, such as proper card handling, good housekeeping habits, neatness of reports, report heading, and so forth.

Teaching evaluations

It was apparent that no single method could be used to evaluate a student hence the instructors maintain close scrutiny of each student's progress and include an evaluation in the student's record. This evaluation is based on formal testing, practical machine operation and wiring, class participation and cooperation, and personal observation.

Formal testing could be a guide to the student's retention of technical material but alone it is insufficient since some people are unable to display their grasp of a subject on paper.

Machine operation and wiring are not all that matters to a good operator. It is important that the student have a good working knowledge of machines and wiring principles. But the operator is a person who must work with other people. Any operator who cannot work with others, who is argumentative, sloppy in his work, unable to accept changes in procedures, and has other detrimental habits will not last long, even though he is a good technician.

Judgment on class participation and cooperation necessitates that the instructor be alert and perceptive to detect students with potential supervisory capacities in the classroom. (*The loudest and most aggressive student is not necessarily a leader, often it is the normally quiet, self-contained student who has the capacity for real leadership.*) Occasionally, a problem will be presented that is

impossible to work out on the machines. Then the class is observed as it struggles to solve the problem. Frustration, and the way a student reacts to it, is very important in determining leadership potential.

Personal observation, while closely tied to the foregoing, differs in such things as grooming, attire, attendance, and punctuality.

The results of all four points are recorded on individual student records with an evaluation by the instructor. These records, maintained by the school for an indefinite period, serve both the student and prospective employers since they mirror the individual under actual working conditions.

Additional training

The Data Processing Institute operated in this manner for almost a year, then the directors analyzed the results of the training program. It was found that many of the students who had shown leadership potentialities in school had gone out into the field and proved themselves. The system of evaluation was working.

The curriculum was expanded to include additional visual aids and more advanced wiring applications. Procedure writing and flow chart construction were introduced. Arrangements were made to allow any student all the free machine time he wanted in addition to his regularly scheduled classes. This free time served as a supervised practice period with an instructor present to provide help if needed. Many students accumulated as much free time as class time, a fact which was noted on their records.

The directors of the Institute work closely and cooperatively with many industrial and business leaders and the machine manufacturers, to keep well informed on the latest applications and equipment. This information is passed on to the students. In addition, the student body is supplied with subscriptions to trade publications.

The school also maintains a reference library covering all machines, applications, systems and procedures for all data processing systems. This library is open to students and to anybody in the field.

Trained people available

It is costly for a company to train an individual, whether by on-the-job training or through machine manufacturer's facilities. A company will often have personnel problems in its choice of a trainee. Discord and worker conflict have resulted from some training programs. Sometimes the employee chosen for training does not fulfill expectations, or, after being trained, will quit to seek lusher financial rewards elsewhere. Many companies have stopped all training programs for these reasons. Sometimes the growth of installations becomes limited because of personnel problems, which results in doing the best possible with what is on hand.

Industry has another choice—to utilize trained people. Those who voluntarily seek training show foresight and initiative by the mere fact of seeking to better their knowledge. But just because the individual wants training does not mean acceptance at the Data Processing Institute. He must also pass an aptitude test for screening, and a second aptitude test dealing with situations and logical thinking. Throughout the training period testing is extensive and covers every phase of the course. Both written and practical tests are given and recorded.

Although the student may have had little on-the-job training he has the technical ability of a man in the field with one to three years' experience. Many employers have expressed gratification at the speed with which a graduate will absorb and perform his job, sometimes surpassing some senior employees.

Due to the tremendous growth of machine data processing in the last few years, there have been, unfortunately, a few training centers started that were totally unequipped with either know-how or desire to produce a quality student. This is not sufficient grounds to condemn all schools or all students. On the whole, most schools are doing an excellent job of training students. As with all other new developments, the unscrupulous, incompetent, and fly-by-night concerns were not long in existence. But how can an employer tell the difference? Very simply, he should be able to weed out the undesirable student at the interview. He can also contact machine manufacturers, the Better Business Bureau, or he can check out the quality of the product by other users.

If anyone thinks he cannot hire *good people* he might look around — just to see if he has overlooked something! ■

Competitive Programming

A way to work out better methods and catch errors.

By Van B. Thompson

THE ORGANIZATION of programming efforts in business concerns is a matter which varies considerably from company to company, and even from job to job within one company's data processing department. In some cases, a single individual will be responsible for virtually all of the tasks required to put an application on a computer. He will consult with departmental representatives in the application area, do his own systems study, lay out a general block diagram of his concept of the new system, do all of the computer programming and de-bugging, and be on hand during the *shakedown* period to supervise the console operators. In other situations, the programmer is called in only after a methods or operations research group has done a thorough systems study. In this case, the task of the programmer or programmers is to convert someone else's general block diagram into a workable, efficient computer program.

A third situation, mid-way between the first two, is one in which the programmer works in an advisory, non-decision-making capacity with others in the company during the systems study and formulation of the general block diagram, and then completes the technical job of programming. A fourth method employed features the selection and training of key persons in the applications area so that they, with their detailed knowledge of the job, can do the actual programming. Finally, there is the set-up involving a staff of programmers from which one or several individuals can be selected to join or form a team for a particular project.

Regardless of the overall form of organization, when the time comes for conversion of a systems plan (*general block diagram*) into a computer program it is not unusual for the programming to be done by a team of two, three, or even more programmers. Very often, each is assigned the task of programming one or more sub-routines. Then, by means of appropriate heading instructions in an assembly language such as SOAP II, the sub-routines can be joined together to form the complete program. Obviously the efficiency of the whole program (*assuming a satisfactory general block diagram*) will depend to some extent on the efficiency of the weakest sub-routine, and therefore on the weakest programmer on the team.

Two other programmers and I recently used a different approach while working as a team to program a payroll and labor distribution routine for the IBM 650. This job fell naturally into several sub-routines, once the general block diagram had been developed and input/output procedures and card forms had been decided on:

1. A transfer routine to get master card data out of the read area.
2. A routine to compute gross pay.
3. A routine to compute social security, federal income, and state income taxes.
4. A routine to compute regular deductions; compute and test savings bond balance; compute, test, and if necessary adjust net pay; and update year-to-date and quarter-to-date balances.
5. A routine to distribute labor costs.
6. A routine to do additional labor distribution calculations and overtime analysis, and to punch out labor distribution figures.

Instead of assigning, say, two of these sub-routines per man, we first programmed sub-routine number one together, and then independently programmed each of the remaining parts, one sub-routine at a time, on a competitive basis. Deadlines were established for completion of each sub-routine, at which time we met and exchanged programs. Each of us did a manual trace of another's routine, to uncover any errors. After the programmer had corrected his errors, we again exchanged programs and followed a system we developed for estimating running time of a routine in SOAP II form. The fastest of the three sub-routines *won*, and was incorporated into the program.

The *losers* benefitted from a comparison of their routines with the most efficient version; and, since each of us *won* and *lost* one or more times, everyone learned something in the process. The program which resulted from all of this was a very efficient one.

Fortunately, we had ample time to program the job, a rare situation in some computer installations. We felt that the increased efficiency of the final program more than made up for the extra man-hours expended. And for an educational situation—such as a college programming course, an industrial training program, or on-the-job training of relatively inexperienced personnel—*competitive programming* has much to offer. ■

De Paris on EQUIPMENT —A Regular Feature

Direct Input Methods

JOSEPH R. DE PARIS

MAGNETIC INK CHARACTER RECOGNITION (MICR) and Optical Scanning are the twin harbingers of another dramatic breakthrough in data processing. These new techniques promise to demolish one of the biggest and more costly problems in data processing, the problem of automatically converting raw data from source documents into a machine-sensible, machine-processible form.

Up to now there has been little choice but to manually keypunch and verify punched cards, which are then used for automatic input to electronic or electro-mechanical data processing systems. Of course, methods such as mark-sensing and the punched paper tape of IDP are being used successfully to automate input preparation. However, MICR and Optical Scanning have a potential and scope which could never be realized by these older methods of capturing source data.

Why is this so? What is so different about MICR and Optical Scanning? Simply this. Properly applied, these techniques bring into play new electronic machines which have the ability **1)** to *read* numbers, and/or letters and special characters printed on source documents, and **2)** to convert these readings at high speeds into electronic bits, which may be read directly into a computer, or into punched cards, paper tape, or magnetic tape.

Process from source document

Just imagine what your procedures might be, how much more effective and efficient your systems would be, if you could but receive your source documents and feed them directly into an automatic machine which creates your cards, tape, or computer input. No more keypunch bottlenecks, no more keypunch training headaches, no more keypunch cost. Operational steps reduced, procedures simplified, reports more timely; all these are the by-products of *properly* utilizing MICR or Optical Scanning.

These new methods of creating automatic input are related in their concept, but very different in their application. They are related in that both have the ability of directly reading data on original papers. Both read characters which are in a form recognizable to machines and to the human eye.

In appreciation, magnetic ink characters must be *printed* in ink which has magnetic characteristics. The characters themselves each must have a unique form which ensures accurate translation. By contrast, optical scanning does not require special inks or print quality impressions. Instead, typed or printed characters of certain normal type fonts are read and converted to input form.

MICR must operate in a tightly controlled situation insofar as printing is concerned. Not only must the ink have magnetic qualities, but the printing itself must be of high quality with sharp definition. Printed characters have little tendency to *bleed* at the edges. Typed characters and even 407 characters, examined under a magnifying glass or microscope, show *bleeding* at the edges which makes the characters very difficult to distinguish magnetically. This fact makes it imperative that the printing be done by letter press or by other good printing techniques.

MICR numeric only

Magnetic ink character recognition to date has been confined to numerals only. This condition is likely to prevail because magnetic reading requires such specialized forms for each character. If letters and special characters were added to the system, the configurations would be so varied and so strange that the ability to read characters by eye as well as by machine would be lost.

MICR enjoys its greatest advantage in an industry like banking for handling and processing of checks. Here account numbers are preprinted in magnetic ink and inscribers are used to print MICR amounts. Check processing thus becomes automated.

MICR is especially advantageous where documents are subjected to much handling and where stamping, pen, pencil, and other markings are likely to intrude on the magnetic character areas. None of these affect readability because the magnetic quality of the ink is not impaired; therefore, reading is undisturbed by these foreign particles.

The limitations of MICR lie in the inherent rigidity of the system. The ink is special and fairly expensive. The characters are of a unique type font and are confined to numeric representations only. Inscribers for variable factors are costly, particularly if required at many work stations. Magnetic ink ribbons add to the expense. Finally, the positioning of the magnetic characters on the source document must be precise and confined to predetermined areas in order to assure accuracy of character recognition and to minimize the number of rejects.

Future of MICR

What of the future for MICR? From here it appears that this method has a permanent niche in data processing. Situations in which printing can be controlled, where numeric data alone is involved, and where industry control can be standardized, will be the particular realm of MICR. Banking will probably be the prime user of this technique, but it may well expand into the insurance business for the so-called *preauthorized check* method of collecting premiums.

Look for an expansion of MICR possibilities if a high-speed printer

(continued on page 47)

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DATA PROCESSING

Dreyfack on PERSONNEL —A Monthly Feature

Give Your New Employee a Break at Break-in Time

RAYMOND DREYFACK

HIT OR MISS METHODS of hiring are pretty much a thing of the past. Today's management and personnel experts stress the importance of scientific evaluation of applicants. The employee interview has become quite an art.

Hopefully and intelligently, the hep data processing manager wants to staff his installation with the most promising help available. He realizes that all it takes is one man to foul up the best system, or reduce to ineffectiveness the most powerful equipment.

All too often, however, after going to great pains, time and expense to assure the hiring of potentially competent personnel, a manager will cancel out all the gains obtained by blithely ignoring the sensitively critical break-in period.

There are two ways to look at it. One: as a busy manager who feels that until the new employee has become familiar with the operation, until he has learned to produce, he is little more than an extra stick on the woodpile. The other viewpoint is that of the new employee himself. How does he feel? What are his reactions?

One point must be kept in mind. When a man accepts a new job, whether it's company president or office boy, he has just made a major move in his life. He's sensitive, uneasy, and maybe more than just a little worried. Has he made the right move? More than anyone else, whether consciously or not, the man's superior will be providing the answer.

New hire

Let's take the case of job applicant Bill Grimes: punched card machine operator, aged 24, two years' experience, better than average intelligence. Married six months ago.

By all the rules Bill should develop into an asset employee, maybe even with leadership qualities. But employment is a two way street. The data processing manager knew why he wanted Bill. Did *he* know why *Bill* wanted the job?

Chance for advancement! This is the most trite phrase around, but it means so much. On Bill's old job he was standing still. After taking the time and effort to learn wiring on his own he found no opportunity to use his knowledge. He was smart enough to realize that a man's future should consist of a little more than pushing buttons, so he decided on a change.

When Bill was interviewed for the new job he was assured of the potential growth that existed. New equipment was on order; new applications being undertaken. The installation was expanding. The opportunity was there for a sharp operator to expand with it.

Great, Bill thought. This is exactly what he had in mind.

Now let's take a stroll with the manager and Bill to the machine room floor. The interview is over, and with this done the first phase of Bill's introduction to the company ends. Of course, to a certain degree, the initial courtesy and consideration will persist—no one is going to be rude to Bill—but in too many cases the personalized attention is cut short at this point. Bill is now just another cog in an already operating machine.

On the data processing floor the manager introduces Bill to his assistant. Then he looks at his watch. Details start to crowd his mind: the meeting in 30 minutes, the layout sheet that has to be completed, the 407 board that still has to be debugged.

So he turns Bill over to the assistant. "Take him around, will you, and give him an idea of what we're doing."

"Sure thing." Aye, aye, sir, and all the other formalities. Only trouble is the assistant has problems too, more details. So Bill is introduced to one of the operators. With a paternal pat on the back he is told: "Jim runs the gross profit breakdown. That ties into some of the stuff you'll be working on. Jim'll show you what he does, and I'll be back later."

So, at this point, the responsibility for introducing Bill to his job and the company has been shifted from manager to assistant to operator. If we're lucky, and if the porter doesn't happen along, we might leave it at that. But what, actually, has happened?

Break-in or breakdown?

The assistant's promise to be back "later" will probably be *much* later. So Bill commences his break-in period by "hanging around." After a couple of days this makes him feel uncomfortable. He's beginning to feel like a sixth wheel now, *just like on the old job*. Oh, every now and then he is given a sorting or collating job, but he can't tie this into anything that makes sense as far as he's concerned.

He's new on the job and not overly aggressive. There's no one he can confide in. Doubts begin to assail him. Did he stumble onto another dead end? At interview time he felt like somebody. Now he's nothing again.

When Bill resigned at the end of the week the data processing manager was mildly surprised. He thought the guy was doing okay. But these things happen. You never can tell with a new employee. And he hadn't the time to wonder why.

Maybe if he had taken the time, he would have come up with some interesting deductions. They might have gone something like this:

He hadn't properly defined the job Bill was to eventually take over, or

(continued on page 47)

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...a compact, multi-duty Electronic Data Processing System

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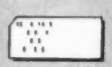
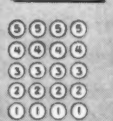


3 PUNCHED CARDS



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BILL KLUMPP

OUR CONTRIBUTING PERSONNEL EDITOR, Raymond Dreyfack, the director of tabulating systems for Faberge Perfumes, was named the winner in a recent contest sponsored by Allen Hollander Company. Mr. Dreyfack devised a system to cut costs, simplify and encourage the prompt and continuous updating of procedure manuals.

This is how his system works. When a change is made in procedural specifications, one or more cards are punched to record the information, which also includes the date and reference code. The cards are run on an accounting machine, set eight lines to the inch, on pinfeed, pressure sensitive labels. There is room for more than 400 characters on each label. The hold circuitry of the machine makes it possible to print an unlimited number of labels from a single card.

After the labels are printed they are cut apart and distributed to the departments involved. The label is peeled from its backing and affixed to the proper place in the manual. This procedure eliminates retyping entire manuals and affords some guarantees that the manuals are updated.

"THIS OUGHT TO BE GOOD . . . I PUNCHED THIS CARD WITH MY SPIKED GOLF SHOES!"

Easy report duplicating

Have you ever had rush requests to run a hundred copies of the same report for one of your company's departments? If you have, perhaps you will appreciate the convenience of cutting mimeograph stencils on the accounting machine. Instead of running the same deck of several hundred cards 20 or 25 times, you run the same cards only once. This will save more than an hour of machine time.

This is how to do it. Remove the ribbon from the machine. Insert an A. B. Dick 1160 blue mimeograph stencil with the glossy cushion sheet around the carriage platen, just as you do when using single sheet forms. If you do not have A. B. Dick stencils, comparable stencils made by other manufacturers will do. The lines on the stencil are numbered. If you need to stop printing on any line, such as line 76 for instance, you can be ready to depress the stop button several lines in advance. You insert another stencil, set the pressure release lever and depress the start button. You continue to insert and cut the stencils until all the punched cards have passed through the machine. If more than 100 copies are needed, this is no problem for each stencil will produce up to 1000 copies.

Cleaning typebars

During rush periods at the first of the month, can you spare an expensive accounting machine for two hours or more while the customer engineer removes imbedded deposits from the letters and numbers? There is a faster method of cleaning. This is to use a sticky plastic pad, developed for the purpose by Minnesota Mining and Manufacturing Company, After removing the ribbon from the machine, you can fit two of these 8½" x 11" pads together to form a single pad 11" x 17". This is inserted into the accounting machine just as you would insert a single sheet form. Put in a deck of 40 cards which have the alphabetic characters and numerals punched in rotation, depress the start key and a few minutes later each typebar is clean. Ask your local 3M Company Branch for Typewriter Cleaner #575.

Indexing files

Are you faced with the problem of indexing payroll, accounts receivable, accounts payable, inventory and other types of files? Then you'll be glad to hear about plastic Self-Index Guides. These guides are made of transparent plastic material, like the plastic page covers in the notebooks of salesmen's kits.

Here are the details. Standard blank punched cards are approximately 3¼" x 7⅜". At the bottom of the guide, in the middle, is a slot. You place the punched card under this semi-circular slot. The top of the card fits under the plastic lip. The interpretation at the top of the card is protected by the lip which is ⅜" wide and which extends across the top. Two of the manufacturers who make these guides are:

Remington Rand Univac Div.
The Sperry Rand Corporation
315 Park Avenue
New York 10, New York

The G. J. Aigner Co. (AICO)
428 South Clinton Street
Chicago 7, Illinois ■

Let us know your punched card data processing problems. We have, at our beck and call, the services of scores of manufacturers and thousands of data processing technicians throughout the country. Send your problems or comments to:

PUNCHED CARD IDEAS
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DETROIT 26, MICHIGAN

New Equipment

Conventional typed and printed information can be read for the first time directly into a computer by the IBM 1418 optical character reader. The operator holds life insurance premium notices, one of many types of business records the machine reads at speeds up to 480 characters a second and 400 documents a minute.

This reader automatically converts numerical printed data to computer language which it feeds into the magnetic core memory of an IBM 1401 magnetic tape computer for processing. Following the reading cycle, the documents are automatically sorted into the desired order.

Optical Reading Machine

Both typed and printed business information can now be read directly into a computer memory for high-speed data processing.

The announcement — a major advance in computer technology — was made by International Business Machines Corporation with the introduction of its 1418 optical character reader. The new solid-state unit reads data printed in widely-used type styles on paper or card documents, at a rate of 480 characters per second. As many as 400 documents a minute may be read. The printed data is automatically translated into machine language for direct input to an IBM 1401 computer.

The 1418 reads numbers printed ten characters to the inch in a standard IBM type by 407, 408, or 409 accounting machines, the 1403 printer, or an electric typewriter. It can also read numbers in the elongated 407 type style, commonly used by credit card imprinters, which is seven characters to the inch. In addition, the 1418 can be equipped for mark-reading — in which vertical markings made with ordinary pencil or dark inks represent specific information determined by the format of the document.

Handles varied documents

The optical character reader handles documents of various sizes and thicknesses. Forms can be anywhere from 5⅞″ to 8¾″ wide by 2¾″ to 3⅔″ high. Their thickness can vary from that of bond paper to punched card stock. Any printed documents within these dimensions —premium notices, imprinted charge slips, telephone bills, tax notices, coupons, and continuous-card forms, for example — can be used as direct input to the 1418-equipped 1401 system.

As the documents feed into the 1418, they are separated and aligned, one document at a time. Each form then feeds individually onto a revolving drum, where it is held flat by a vacuum. As the drum revolves, the complete surface of the form passes under a lens system.

The standard 1418 contains one optical reading station, which will read a single type style from any line on the document. Available optionally are either a second reading station or a mark-reading station. With the second reading station, two lines can be read in one pass of a document through the machine. These lines can be in the same or different type styles.

Unique scanning method

The 1418 employs an exclusive scanning method which recognizes a practical range of print quality. The characteristics by which each number is identified are contained within the solid-state circuitry of the reader. The light image of a character is converted into electrical impulses which are compared and matched with internal logic patterns. Numerical characters are individually recognized in this way and transferred one at a time to the magnetic core storage of the 1401 system.

Once in storage, the data from the printed forms can be processed and the results produced as punched cards, magnetic tape, or printed reports by the 1401. The forms from which the data were read are fed by the 1418 into its appropriate sorter pockets.

While the 1418 is reading, the 1401 can perform independent functions, such as magnetic tape to print-

er operations. The magnetic tapes prepared on the 1418-equipped 1401 can also be used for input to larger IBM data processing systems.

The 1418 reader can be used with any Model C, D, or E 1401 magnetic tape data processing system. It is available in two models — Model 1 with three sorter pockets and Model 2 with thirteen sorter pockets. When not in use with the 1401, the Model 2 can be used for independent optical sorting of printed forms and cards.

The Model 1 rents for $2,600 a month and sells for $120,300; monthly rental for the Model 2 is $2,900, with a purchase price of $133,800. A 1418 adapter feature for the 1401 rents for $100 a month and sells for $3,750. An additional read station for the 1418 rents for $125 a month and sells for $5,450. A mark-reading station rents for $125 and sells for $5,950.

The 1418 optical character reader for the 1401 will be manufactured at IBM's Endicott, New York plant with initial deliveries scheduled to begin in the first quarter of 1962. It can be installed in the plant or on a 1401 in the user's office.

Circle no. 30 on reader service card.

Instant Mail

An electronic reading and printing system, which makes it possible to transmit mail from one city to another in seconds, has been developed by Stromberg-Carlson, San Diego.

Stromberg-Carlson, with headquarters in Rochester, N.Y., is a division of General Dynamics Corporation. The U. S. Post Office Department is now trying the system on an experimental basis between Washington, D. C. and Chicago.

Facsimile transmission of mail enables a letter to be placed before an electronic scanner which sends an image via standard TV-type communications lines to a distant point where an exact reproduction is made. In the new method being studied by the Post Office Department, a letter would then be treated as private mail and delivered in the normal manner. The scanning portion of the system will "read" any mechanically printed or handwritten material or line drawings. The printer portion of the system will then reproduce this material in black and white.

Among the key equipments in the prototype speed-mail project are the facsimile scanning and printing system developed by Stromberg-Carlson-San Diego. The printer in the system utilizes the xerographic printing process of Haloid Xerox, Inc.

The Intelex Corp., a subsidiary of International Telephone and Telegraph Corporation, is the systems manager for the speed-mail program.

The development contract with the Post Office Department calls for design and installation of 14 high-speed facsimile printers and eight mail scanners at test sites to be designated. Fifteen standard letter-size pages per minute are sent on the machines. This is 400 times faster than the facilities of the major press associations for transmitting pictures.

Another advantage of high speed mail transmission is the compactness of the equipment and its modest space requirements. Its adaptation to postal operations would effect some reductions in space needs, a boon especially to overburdened major post offices. It would provide relief to congestion in culling, facing and canceling operations, and greatly reduce sorting time.

Transmission

Transmission of mail images from the Stromberg-Carlson designed S-C 6400 Scanner to the S-C 6000, which incorporates the Haloid Xerox high speed xerographic printer, will be via commercial coaxial cables or microwave communications links.

In order to preserve the privacy of the mails, the system will include a special type mailing form which can be automatically opened by machine. The machinery which will perform this task is being developed by Pitney-Bowes, Inc., and will be mated to the Stromberg-Carlson scanner and receiving equipment.

The price of this service has not yet been determined, but it will be low enough to attract large quanti-

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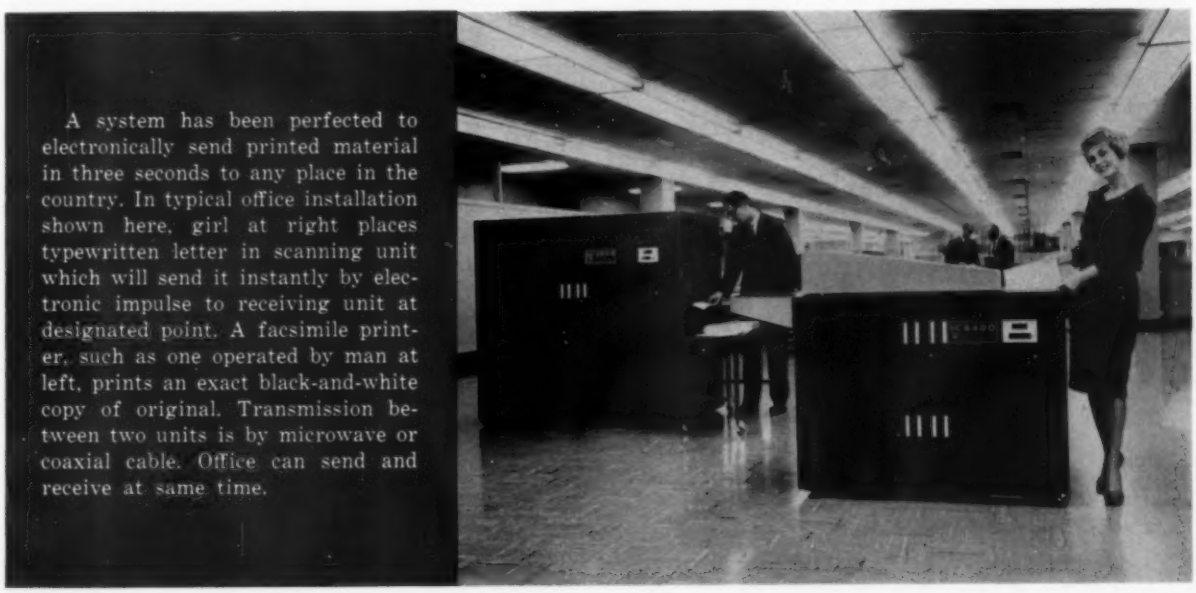

A system has been perfected to electronically send printed material in three seconds to any place in the country. In typical office installation shown here, girl at right places typewritten letter in scanning unit which will send it instantly by electronic impulse to receiving unit at designated point. A facsimile printer, such as one operated by man at left, prints an exact black-and-white copy of original. Transmission between two units is by microwave or coaxial cable. Office can send and receive at same time.

ties of mail, according to a Post Office spokesman.

Under a previous contract, Intelex conducted tests with available commercial slow speed and high speed transmission and receiving equipment. Thousands of messages were sent between Washington, D. C., San Francisco, Los Angeles, Detroit, and Battle Creek, Michigan. Included in the live-testing program were regular letters, official reports, maps, graphs, blueprints, charts, photos, fingerprints and contracts.

Scanner

The scanner operates by sweeping a minute spot of light across the face of a cathode ray tube 360 times per second. The spot of light is focused on the letter being transmitted as the letter moves along a conveyor belt. The light is then reflected and picked up by a photo-multiplier tube, which puts out a voltage proportional to the reflected light. Since the light is reflected more from light areas of the paper than from the dark, a varying signal results. The scanner then shapes this signal into levels denoting either black or white which are transmitted to the printer.

A similar cathode ray tube in the printer at the receiving end is synchronized with the scanner. Since the spot of light emitted by this tube is modulated by the voltage output from the photo - multiplier this varying light source is used to produce the transmitted image on the light-sensitive, electrostatically charged surface of a rotating xerographic drum.

Black powder within the printer cascades over the drum, adhering only to the areas which have not been discharged by the light beam. As the drum rotates, the powder is transferred to ordinary paper. Heat then fuses the powder into the surface of the paper, making the printed material fixed and permanent.

Since the scanning and printing system utilizes standard TV or microwave communications links, commercial and government applications for the transmission and reproduction of graphic information appears unlimited, according to the manufacturer.

Circle no. 31 on reader service card.

Tape Handler

A new bi-directional perforated paper tape handler, offering an economical method for the handling of large quantities of tape at high speeds, has been announced by Digitronics Corporation.

The new handler, DYKOR Model 4566 "Servo-Spool," permits forward or reverse reading of perforated tape at speeds up to 400 characters per second, and rapid rewind at 1,000 characters per second.

Eight-inch reels, which hold 500 feet of tape, are controlled by a three-zone contactor system which performs the same function as a full servo system, and accepts five to eight-level tapes interchangeably.

Measuring 10½ inches in height and 19 inches in width, the "Servo-Spool" is designed for use with the DYKOR uni-directional Model 3500 or the bi-directional Model B3500 high-speed photo-electric tape readers, which can function in the strip mode at 1,000 characters per second. It mounts on standard 19 inch relay racks directly beneath the reader.

Circle no. 32 on reader service card.

Univac Cobol Compiler

COBOL *(COmmon Business Oriented Language)*, long considered the business data-processor computer language of the future, became a reality when on October 31 Remington Rand Univac successfully compiled an actual customer application using what is believed to be the first *complete* COBOL programming system anywhere.

Remington Rand Univac, in cooperation with the Univac Users Association, implemented the new computer automatic compiler system providing a common language for computers that can be read and understood by humans. It presently is available for Univac II data processing systems. A COBOL compiler will be made available for the Univac Solid-State 80 computer before mid-1961 and COBOL compilers will be available for other Univac computing systems at time of first delivery.

Advantages listed by Univac officials for the new automatic programming method are:

1) Reduction of original programming time.
2) Reduction of program debugging time.
3) Reduction of program revision and updating time.
4) Reduction of programmer training time.
5) Increased use of systems analysts in closer relationship with programmers and the computer.
6) Easier understanding of computer operations by people without computer training.

All of these factors reduce programming costs considerably.

Reduction of original programming time means reduced amount of coding to be written through a form of short-hand or *pseudo-code*. Less coding to be written lessens opportunities for mistakes. Thus debugging time is reduced by the use of previously checked sections of coding and by fewer coding mistakes. Since revising and updating can be carried out at the pseudo-coding level, and the computer instructed to make necessary changes, program maintenance time is reduced

Programmer training time is reduced because it is no longer necessary to learn the finest detail of the operation of each and every computer component and instruction. It is only necessary to learn pseudo-codes defining computer operations at a functional level. With a shorter training time, it becomes economical to teach systems analysts as well as programmers to prepare problems for computer operation. As the pseudo-codes grow to correspond to natural language, the solutions of problems become comprehensible to all concerned, from top management down to the computer itself.

Circle no. 33 on reader service card.

Univac 1206 Military Real-Time Computer

The Univac 1206 Military Real-Time Computer is a general-purpose computer which is built to rigorous military environmental specifications *(MilE 16400)* and is ideally suited to operate under severe conditions of shock and vibration, such as on ships, submarines, airplanes, trucks, trailers and rail cars.

Designed for the processing of large quantities of complex data, the Univac 1206 emphasizes random access storage of information and ease of communication with a wide variety of external and peripheral devices. The random access storage features of the computer enable it to retrieve information or store it in the ferrite-core memory in any sequence or at any time.

Typical applications include: analysis of technical data, range instrumentation, real-time guidance, simulators, tactical control, digital communications, data reduction and analysis and other applications where rugged construction and high computational ability are required.

Internal operations are performed in the parallel binary mode, with a 30-bit instruction word with options of 15- or a 30-bit data words. Instructions are of the one-address type, with an average execution time of 14 microseconds. The computer need not be monitored during operation. Housed in a single cabinet, the Univac 1206 offers easy access for maintenance.

The central computer, including a full maintenance panel, is contained in a cabinet 33 inches deep, 37 inches wide, and 65 inches high. Primary power is supplied from a 60-cycle input, 400-cycle output motor alternator. Total power consumption is 2400 watts. Forced air-cooling is used, with a heat exchange provided, if desired. Interequipment cabling may be run either overhead or through floor ducts. The computer may be easily installed aboard ship or in a trailer, without modification.

Circle no. 34 on reader service card.

Univac Thin Film Computer

Remington Rand Univac Division heralded another computer generation with their December announcement of the Univac 1107 Thin Film Memory computer operating in NANOSECONDS. This is the first computer to employ thin film as control memory.

The 1107 is the first of the third generation of commercially available electronic computers. It is an advanced scale, solid-state data processing system, developed to solve both complex problems off-line and real-time problems on-line.

The 1107 uses a separate thin magnetic film control memory with several internal features enabling the user to gain additional speeds far beyond those built in by electronic circuitry. There are 16 arithmetic registers, 15 index registers with automatic incrementation, and partial word transfer capabilities.

The 1107 accesses its film memory more than one million times per second in normal operation, its two large banks of core memory are accessed at 500,000 times per second.

In addition to the film memory the system uses a ferrite-core memory of from 16,384 words to 65,536 words.

The cycle time *(time required to read and write information)* from the 1107's thin film memory is only 0.6 microseconds, as compared with the cycle time of ferrite-core memories of 1.5 microseconds.

Typical applications that can be processed on the 1107 are scientific computation, data reduction and analyses, digital communication and switching systems, tactical data and control systems, simulation, logistics and intelligence systems, traffic control, reservation systems, and inventory and scheduling systems.

There is a highly versatile input-output section which can accommodate a wide range of peripheral equipment. External units can be used to provide a hierarchy of auxiliary storage, such as drums, discs and tapes. Card units, printers, and document sensing devices also serve as input and output equipment.

The 1107 can communicate with many other real time devices, such as analog-to-digital and digital-to-analog converters, key sets, printing telegraph equipment, digital communication, radar and tracking systems, display systems and other data processing devices.

A typical configuration occupies 150 square feet, exclusive of passageways, work areas, etc. Rental charges range from $40,000 to

(continued on next page)

Dr. S. M. Rubens, director of physical research, Remington Rand Univac, at St. Paul, Minn., holds a substrate of Thin Film, a revolutionary development by Remington Rand Univac which increases the internal speed of electronic computers from millionths to billionths of a second. The new memory is used in the Univac 1107 Thin Film Memory Computer announced.

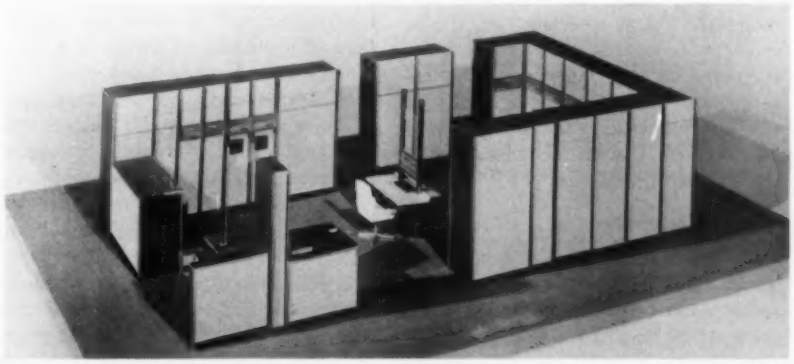

Photo shows model of the first of the "third generation" computers, the Remington Rand Univac 1107 Thin-Film Memory Computer.

$60,000 a month, with delivery 18 months from date of contract.

Univac scientists have perfected the thin magnetic film after seven years of intensive research for new material and design to give computers small size rapid access internal memory. A pilot model production line is now in operation in St. Paul.

What thin film is

Thin film is a ferro-magnetic film *(a few millionths of an inch thick)* made by depositing vapors of iron, nickel, cobalt, or other ferro-magnetic metals or their alloys, on a substrate such as thin glass plate. The film has very unusual properties when deposition is made under controlled conditions. For example, if a magnetic field is applied parallel to the surface of the sub-strate during deposition, the thin film then becomes easier to magnetize in the direction of the field in which it was applied than it is at right angles to that direction. This property allows the magnetic state of such a film to be switched in as little as *one-billionth of a second*, a nanosecond. In a computer memory, this means that information can be stored in and retrieved from the memory with a speed directly related to the speed required for switching the magnetic state of the memory. All of the older types of memories, such as electric relays or vacuum tubes, mercury delay lines, magnetic drums and ferrite cores, were capable only of much slower speeds. Ferrite cores, the fastest of the previous types, could be rated only as high as millionths of a second. Thin magnetic film memories may ultimately permit a thousandfold increase in computer memory speed.

In addition to the high speed switching time *(nanoseconds)* of magnetic states possible, thin film memory is of the catalogue type—its store of information can be interrogated and read-out millions of times without destruction; and with less electric power for energization than other memories.

Production

To fabricate arrays of ferro-magnetic film for computer use, the metal must be deposited in the presence of a magnetic field onto the sub-strate using an evaporative process in a vacuum of the order of 10^{-5} or 10^{-6} mm. of mercury.

To connect these deposits of film to the computer circuitry is a very delicate operation. Ordinary wire cannot be used, so a multi-layer printed wiring on plastic material is required. Ferro-magnetic film arrays are laid onto the printed circuit. The arrays, made up of individual circular ferro-magnetic film elements about one-half mm. *(1/50th inch)* in diameter, are placed on the multi-layer circuit etched in a grid pattern. When the copper matrix is covered with the arrays, it is closed to connect the circuit, and the memory is then complete.

Significance

Ferro-magnetic elements can now be produced which are so small and have such fast switching speeds that they make possible computers of smaller size and greater capability.

The non-destructive readout properties of this new memory film will make computers more reliable. When thin magnetic film begins to be used for logic performance as well as for memory, computers will have even greater capabilities and will be well on their way to self-adaptive functions, such as organizing themselves to do a job in the best possible way, and even to program themselves.

Circle no. 35 on reader service card.

UNIVAC 490 Real-Time System

The Univac 490 Real-Time System is the first announced data processing and communications system supplying facts and results virtually without time loss. *Real-time* describes computer operation that is simultaneous with an event, such as controlling and altering the trajectory of a missile in flight. In a combined inventory and production control application, this system can exercise continuous and instantaneous control over complex company operations nation-wide in scope.

The Univac 490 is a breakthrough providing instant problem solving information for business executives and scientists where rapid decisions are needed. The central computer immediately solves problems given it from widely scattered locations and delivers answers fast enough to control the operations containing the problems. Thus, numerous transmitting and receiving devices, possibly numbering in the hundreds, located in widely scattered areas, can communicate directly with the central computer.

Prior to a *real-time* system, electronic computers lost time during the interval between feeding in data and getting results. While the majority of data processing needs are complied with in the historic type of computer, there are many other applications that require instant response.

Included as standard equipment with the Univac 490 system are some of the most advanced electronic devices and techniques developed to date . . . computers that *talk* to each other, push-button units that trigger instantaneous messages to and from the central *nerve center*, English language communications between operator and computer, and solid state circuitry.

Electronic Real-Time clocks can be read by a control program, which automatically indicates system activities or which sets an alarm whenever something happens that should be brought to the attention of management, or signals the system itself to take specified action automatically.

While the number of units in a real time system will vary with individual need, standard components include the central computer, supervisory control panel, remote input/output sets adaptable to different needs as remote sending and receiving units, a high-speed communications control unit, programmer scanners that control communications between remote locations and the central computer, expandable magnetic core and magnetic drum memory units, and Uniservo magnetic tape units. The system has an internal ferrite core memory of up to 32,768 words. Ready made programs are available for English language and automatic programming techniques. Rental is $20,000 to $40,000 a month, depending on configuration. Delivery is 18 months from contract signing.

Circle no. 36 on reader service card.

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PRODUCTS SERVICES

BURROUGHS A570 VERIFIER

Burroughs has introduced the A570 check digit verifier to eliminate human error in encoding account and other reference numbers in punched paper tape.

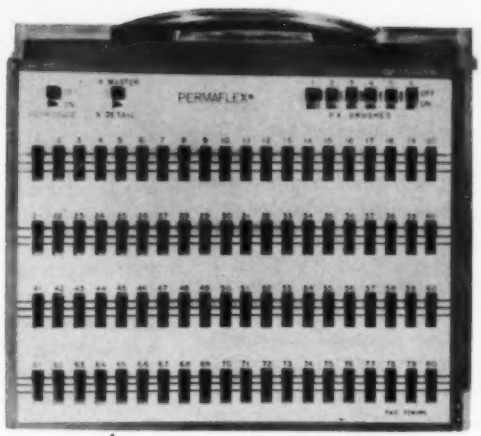
About the size of a portable radio, the verifier is actually a solid-state electronic computer. It will operate cable-connected to Burroughs accounting machines that produce tapes for subsequent data processing. The price is $1,350.

In the past, mistakes made in indexing reference numbers into tape have been difficult to trace; the A570 catches mistakes beforehand by performing a mathematical computation upon account numbers to be entered into tape. With a check digit, a single digit added to a regular account number, it performs a "double-add-double" calculation.

For instance, digits in the number 4321 are alternately doubled, from right to left, giving 4622. These digits are added to total 14. This sum is subtracted from the next power of 10 — in this case 20 — to produce 6, the check digit.

If the result of this calculation fails to agree with the check digit, the machine locks and signals that an error has been made *before* the number is punched into the tape.

Circle no. 40 on reader service card.

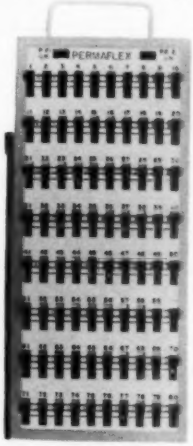


PERMANENT CONTROL PANELS

The new Permaflex panel, permanently wired unit built into standard Tech Panel Company's panels, features exclusive four position slide switches. It allows the operator to reproduce and compare into blank or pre-punched cards or intersperse, gang punch and compare.

The Permaflex units are guaranteed for two years against defects in workmanship and materials. All replacement or repairs of defective parts made within that period will be free if the panel seals are unbroken. Permaflex panels come in types 513, 514, and 519.

Circle no. 41 on reader service card.



BANK-BY-MAIL SYSTEM

Magnetic Ink Character Recognition (MICR) sets for banking-by-mail have been developed by the Cupples-Hesse Company, a division of the St. Regis Paper Company.

The system uses a MICR printed form consisting of three elements: mailing envelope, deposit slip, and depositor's receipt. All elements are attached and perforated for easy separation and meet specifications of the American Bankers Association.

By coding all three elements of the document in magnetic ink with name, address, and code number, all transactions can be processed mechanically after the initial amount deposited is encoded by the proof operator. The most important time saving element is the pre-printed depositor's receipt which can be returned in a window envelope.

Circle no. 42 on reader service card.

AUTOPIC

AutoPic (Automated Personal Identification Code), announced by IBM, is a personal identity code that compresses filing operations. It enables any name to be translated automatically by a computer into a

numerical signature 15 characters in length. This signature is based not only on the letters in the name, but also on other personal data, such as physical characters.

Of the 15 AutoPic characters, the first 10 are derived from combination of letters in a name. In motor vehicle applications the last five positions in the code describe the physical characteristics of the licensee, including eye color, sex, height, and birthdate. For other uses, the physical data portion of the code may be modified to include home address, occupation or other information.

Any existing alphabetic file can be converted to a numeric file by processing a name and physical characteristics (or other data) with the computer program. The computer automatically assigns a number. When name and physical characteristics are already contained on cards, no manual steps are necessary to generate the code. Though arranged by number — only the first character of the code is a letter — the file falls into alphabetic order.

In the event that identical names and birthdates should be in the same roster for two people, the computer would derive duplicate numbers for each; with the AutoPic system provision has been made to permit the re-coding of identical numbers so that one is differentiated from the other by an alternative number.

The AutoPic program for the IBM 650 is now available.

Circle no. 43 on reader service card.

NEW COLLATORS

Thomas Collators, Inc. has re-engineered both its semi-automatic and mechanically operated eight, 10 and 16 sheet collators. The eight-sheet model now provides complete flexibility in a range of sheet sizes from 4″ x 5″ to 13″ x 17″, through a broad range of weights and finishes. The other models take sheet sizes up to 17″ x 22″.

Changes include the addition of new sheet separators on each of the trays holding the stacks of paper. These separators break the top sheets from their respective stacks to insure single sheet feeding and free feeding of prepunched or die-cut stock. The feeding arm drive mechanism now travels on ball-bearing wheels on a special die-formed track, adding to the accuracy and smoothness of movement from the drive mechanism through feeding arms to the sheets themselves. A finger-tip stroke control mechanism permits the operator to adjust the length of feeding arm travel for various depths of paper; and a new toggle-clamp back stop permits a range of these settings between a 5″ and 17″ depth. Settings are marked on the dial to conform to the exact paper size being collated.

The collators also feature a new flip-top housing for ease of accessibility to working mechanism. Keeping of accurate production records has also been simplified by installation of an automatic counter in each unit.

Circle no. 44 on reader service card.

FACITAPE

Autonetics recently displayed Facitape, a tape accessory available through their licensing agreement with Atvidabergs Industrier of Stockholm.

Facitape comes in three models: a tape reproducer which duplicates punched paper tapes at the rate of 150 characters per second; a tape translator which reads punched tapes at the rate of 600 characters per second, and a combination of the reproducer-translator equipment in a tape console. The equipment can be used separately or in combination.

The new equipment may be adapted for both on and off-line applications and is compatible with almost any present type computer. It can be used with data loggers, plotters, typewriter punches, present paper tape reproduction equipment and numerically controlled machine tool equipment.

Facitape uses a capacitance reader instead of the photo-electric and mechanical readers used in most computing equipment. Capacitance readers measure the specific electric current flow through punched holes in the tape.

The tape punch has a speed of 150 characters a second within the five to eight data channel range. It can be adjusted for use with all types of tape — paper, acetate, mylar, and mylar-aluminum.

Circle no. 45 on reader service card.

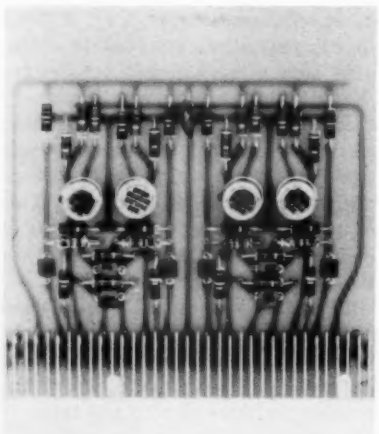
HIGH DENSITY MODULES

Two to four times the circuit density of previous units are features of a new line of 200 kc digital modules announced by Packard Bell Computer Corporation. The new modules are contained on 4″ x 4″ glass base printed circuit cards incorporating an Elco 35-pin connector.

Four identical but independent flip-flop circuits are provided on the model TF-101. Each flip-flop includes set and reset diodes plus AND gates for use as a binary counter or shift register. This is priced at $110.

Additional circuit configurations offered on other models include gate drivers; diode gates; input gates; Nixie drivers; and transistor drivers. The new modules are compatible with PBCC 15-pin digital modules. Two rack mounting module cases are available, incorporating integral power supplies, for 72 and 250 modules.

Circle no. 46 on reader service card.



RCA SIGNAGUARD

A scrambling device which makes forgery of passbook signatures in the withdrawal of savings bank deposits almost impossible has been announced by RCA. The device, Signaguard, scrambles signatures which are reconstructed at the bank to compare with original. Banks are expected to use this device in conjunction with centralized electronic data processing systems.

This would enable a customer to go to any branch and withdraw funds; the teller does not need tub files for checking as the signature is checked for him through direct lines from his calculator to the central computer. The computer would perform necessary arithmetic and update the passbook, returning this information directly to the teller at the window. Should the withdrawal slip call for more than is on deposit the computer reports this.

Signaguard may be likened to a cable or telephone wires, with each individual wire being a glass tube instead of copper wire. Each tube picks up a small segment of the signature and transmits it to the other end of the tube via a devious route. This scatters signature segments throughout the unintelligible mass that is imprinted on sensitized paper at the other end of the tube. In the bank the fiber optics tube is reversed to bring the scrambled signature back to its original form for comparison with the signature submitted to the teller.

Circle no. 47 on reader service card.

TELEPUNCH INTERCOUPLERS

Systematics, a Division of General Instrument Corporation, has announced a new series of Telepunch Intercouplers which provide direct machine - to - machine connection between IBM card punches and standard Model 28 Teletype sending and receiving sets.

The Telepunch intercouplers are designed to solve two major problems inherent in data processing systems; that of providing prompt, accurate input data to the processing equipment, and the rapid communication and conversion of punched card output data in a form readily understood by the people who will act on it—printed copy.

Another function of the Telepunch is translation of "source information"—or input data—from manual keystroking to punched cards and punched tape, or from one machine language to another.

Card transmitter

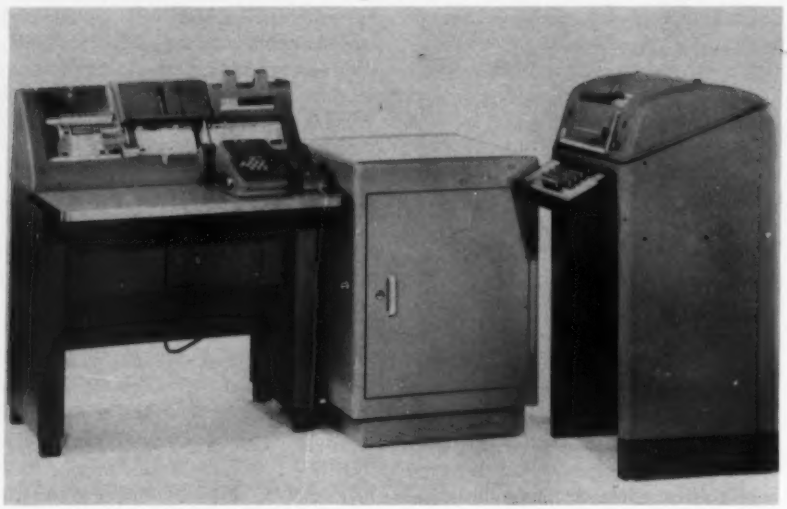
The T585 Telepunch transmitter permits transmitting from 80 column cards or eight-channel punched tape directly to standard teletype equipment—with local page print-out if desired. Use of the T8045 Telepunch card receiver provides automatic, on-line card punching of incoming teletype messages as they are received. Conventional teletype receiving equipment may be used simultaneously to prepare typed copy and five-channel, chadless punched tape.

Installation of Telepunch intercouplers does not interfere with normal operation of teletype or other equipment. Both machines may be used independently by simply switching off the intercoupler.

The transmitter sends a teletype message directly from punched cards through a standard Model 28 Teletypewriter. An IBM 024 or 026 card punch, cable connected to the T585, operates as an automatic card reader. The card codes are translated to five-bit teletype code signals and transferred to the Teletypewriter which sends the information over the telegraph line and also provides local print-out of the message as it is transmitted. The T585 accepts all alphanumeric 80 column punched card codes, and eleven special characters. Because the message is sent over telegraph lines in the form of standard teletype codes, it can be processed by many types of communications and data-handling equipment.

Speed of transmission is governed by a *timing module*—a compact electronic unit which plugs into the teletype transmitter. Three timing modules are available, for operation at each of the three standard Teletypewriter speeds: 60, 75, and 100 words per minute. T585 transmitter speed may be switched to a higher or lower rate by changing the timing module to the speed desired.

Programming versatility in the new T585 is controlled by a plug-



board. Wiring of the plugboard automatically determines which card codes are to be transmitted, and assigns the teletype character to correspond to each card code. High-order zero-to-space conversion, column split, consecutive blank column indication, and programmed character emitting are standard features.

The transmitter is connected through an eight-foot quick-disconnect cable, supplied by Systematics, to a demarcation strip on a Model 28 keyboard send-receive, Model 28 receiving-only, or Model 28 automatic send-receive Teletypewriter.

Card receiver

The new T8045 Telepunch card receiver connects a card punch directly to teletype receiving equipment. Teletype codes from a Model 28 receiving reperforator are accepted by the T8045 and converted to impulses which operate the 024 or 026 card punch. A page-printing teletypewriter may also be installed for simultaneous hard-copy print-out of the received data.

The T8045 will command punching of all IBM alphanumeric codes and eleven special characters. Non-standard IBM characters, such as multiple line printing codes, may be punched by plugboard wiring through distributors. As in the T585 Telepunch transmitter, the T8045 Telepunch card receiver is controlled by a plugboard with exit hubs available for all 58 teletype codes.

The T8045 is a universal speed machine. The card punch is operated automatically at the speed of the receiving teletype equipment—60, 75, or 100 words per minute.

Circle no. 48 on reader service card.

"DIAL-O-VERTER"

Digitronics Corporation announced the completion of a new electronic system which transmits data over the regular telephone network at a speed of 1,500 words per minute.

This new development, called the Digitronics Dial-o-verter System, was created to function with the Bell System Data-Phone 200.

The new system can replace low-speed, electro-mechanical equipment. Currently, data may be transmitted over private telephone or telegraph lines at a speed of six to ten characters per second. The Dial-o-verter System operates via Data-Phone at a speed of 150 characters per second.

When using the Dial-o-verter System and Data-Phone, a person can simply dial, and the person at the other end is ready to send or receive data in machine language. This system can bring information from plants to data processing centers, or from office to office.

The Dial-o-verter System offers more accuracy of data flow than electro-mechanical equipment. It checks the line for transmission, before it permits data to be sent. Other features, designed to assure accuracy of data transmission, include error reporting, error retransmission options, and double parity.

The flexibility of the system permits it to read or write data via punched paper tape, punched cards or magnetic tape. It can transmit data in one medium at one point, and have it received in another medium at the other point. A plant can send paper tape, and have it produced either as cards or magnetic tape at the computer center, or vice versa.

It refuses to send data unless the transmission line is acceptable, and will permit unattended operation. This makes available lower-cost night transmission, and avoids overtime charges for personnel. Since

data to be transmitted may be left in a loaded position on Dial-o-verter, no personnel are required at remote stations. A single operator at the data center can handle the entire operation.

The Dial-o-verter System is based on the Digitronics Model D599SR coupler, which forms the interconnection between the Bell System Data-Phone 200 and any of the data media commonly in use, such as paper tape, punched cards or magnetic tape. When transmitting, it is used with a high-speed perforated tape reader, but also can function with a card reader or magnetic tape handler. When receiving, the coupler functions with a high-speed paper tape punch, a card punch or a magnetic tape handler.

Circle no. 49 on reader service card.

ELECTROSTATIC TELEPRINTER

An electronic teleprinter, firing at a 3,000-word-per-minute clip, was shown to Air Force Association members and delegates at their annual convention.

This machine, now in production by Burroughs Corporation, is currently being employed in the U. S. Air Force 433L Weather Observation and Forecasting system, USAF's 465L SAC Global Communications program and in projects for other branches of the government. Burroughs will ship some 50 of these machines by year's end.

Printing by the Burroughs S 203 Electrostatic Teleprinter is accomplished by a row of solid-state electronic print heads in matrix form that charge paper with electrostatic character images. These images pick up powdered ink as the paper passes through an ink bath and are fixed in hard, permanent copy when the paper passes over heated pressure rollers. Eliminated are ordinary hammering type faces, typical of slow speed impact printers.

Since the paper never touches the print heads and the only moving parts are associated with the paper advance mechanism, the life and maintenance of the teleprinter revolutionizes conventional teleprinting equipment.

In long distance communications and data processing systems utiliz-

(continued on next page)

ing existing local and long distance telephone lines, the high speed printer minimizes circuit time and operational costs.

The teleprinter records alphanumeric or symbolic characters at rates up to 300 characters per second on roll paper 72 characters wide. It can be used as a readout from electronic computers, or operated from input signals from polka dot, punched or magnetic tapes, or telegraphic signals. It has capabilities of speeds up to 60,000 characters per minute.

Circle no. 50 on reader service card.

AUTOMATIC COUNTER

To add the function of automatic counting, a Durant 5-figure YE electric counter was specified by the design engineers of Scriptomatic, Inc. of Philadelphia for their new Model 10 addressing machine. The Scriptomatic which offers an advanced approach to addressing and data writing, gives immediately the quantity of units processed.

The counter, Model 5-YE-8949-Q, records the number of pieces of advertising material addressed. It was selected because of its accuracy, even at high speeds, modern panel mounting readability (with figures set high in the panel), and push-button, finger-flick, instantaneous reset feature. The Durant line of electric counters are designed for high-speed, automated equipment such as addressing machines, computers, controls, and navigation instrumentation.

Circle no. 51 on reader service card.

TELautograph MACHINES

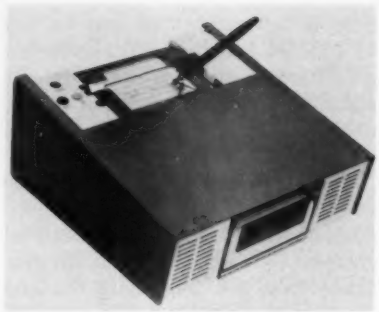
The TELautograph Corporation has a new line of telescribers, Model D, which are expected to increase the scope and usefulness of handwritten wire communications.

The operator writes directly on paper, and can create carbon copies on the transmitting unit; up to three carbons may be made.

The Model D can operate in a radius of up to 50 miles.

Solid state circuitry has been adopted to improve signal quality and transmission range, and to make the machines more compact.

The key instrument in the new line is the transmitter, developed especially for the handling of business paperwork. The new machines measure 12" x 12", with a depth of 5½". It includes a plexiglas container which allows visibility of the instrument's forms supply. The machine weighs 22 pounds.



Transmission is by ballpoint pen on paper, and receiving is by pen and ink (one copy). Forms can be continuous, marginally-punched preprinted or plain paper; from 5" x 3½" or 7" long, with automatic, sprocket driven form feed.

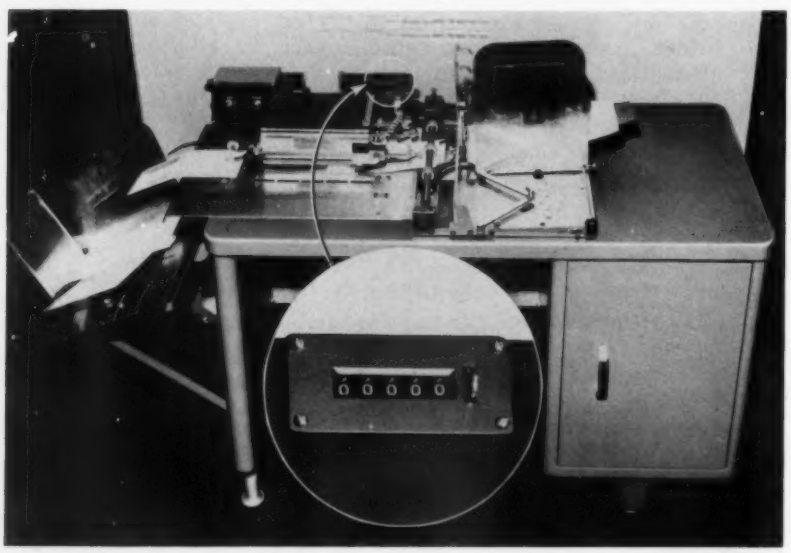
Circle no. 52 on reader service card.

GC PanelLOGICpanel

Just announced by Clarkson Press Inc. is an entirely new type of control panel for use with GC panelLOGIC. Called the GC panelLOGICpanel, this panel has a permanent terminal post in every hub, ready for wiring, thus eliminating the need for inserting individual terminals. Completely interchangeable, the panels can be used for different machines by switching templates.

GC panelLOGICpanels are available in single, double or triple sizes for use in various IBM machine types. Also available are inserts which can be slipped into present frames.

Circle no. 53 on reader service card.



OFF-LINE DATA CONVERTER

A versatile paper tape magnetic tape data converter for off-line use in data processing operations is now available from the Electronic Engineering Company of California.

The new ZA-753 performs three different data conversion jobs: Any type of paper tape can be converted to magnetic tape; Magnetic tape can be converted to any other type of paper tape; any type of paper tape can be converted to any other type of paper tape.

Such applications are suitable for either business or scientific data processing. A typical business application is that of a company with a central office computer and teletype inter-connected branch offices. Ordering, stocking or other business type data may be sent by branch offices during the day or night.

At the central office the data can be converted into magnetic tape in the proper computer format, for entry into the central office computer. Information can also be sent in a reverse direction to branch offices by converting magnetic tape from the computer to paper tape for printout on the electric typewriter equipment.

The ZA-753 in its first mode converts 5, 6, 7, or 8 level paper tape in any coding to IBM 704 or IBM 705 magnetic tape. The second mode is the reverse of the first, converting IBM 704 or IBM 705 magnetic tape to 5, 6, 7, or 8 level tape. In its third mode of operation the ZA-753 converts any level paper tape to any other level paper tape in any coding.

The three-way data converter reads and punches paper tape 160 characters per second. A ferrite core memory permits the selection of data block lengths up to 720 characters long.

Incorporated in the new data converter is a manual-visual check of the mode conversion and the memory. It is completely transistorized employing Engineered Electronics Company all solid-state plug-in circuits. The ZA-753 can be provided to produce magnetic tapes for entry into computers other than IBM.

The complete data converter is supplied in a cabinet 74" high, 48" wide, and 24" deep. Weight is 1100 pounds. The ambient temperature range is 0 to 120°F with no air conditioning required. Price is $62,500 f.o.b. Santa Ana, Calif.

Circle no. 54 on reader service card. ■

Coming Events

1961

Jan. 16-19

ISA Winter Instrument-Automation Conference and Exhibit
Sheraton-Jefferson Hotel, Kiel Auditorium (exhibit),
St. Louis, Mo.
Contact: Wm. H. Kushnick,
313 6th Ave.
Pittsburgh 22, Pa.

Jan. 18-20

American Management Association, Data Processing for Systems Executives, Data Processing Installations

Jan. 20

Association of Data Processing Service Organizations, First Symposium
Contact: W. Evans,
1000 Highland Ave.,
Abington, Pa.

Feb. 1-3

Second Winter Convention, IRE
Biltmore Hotel
Los Angeles, Calif.
Contact: Dr. John Myers,
Hoffman Electronics,
3717 S. Grand Ave.,
Los Angeles, Calif.

Feb. 15-17

American Management Association Data Processing: Punched Cards, Source Data; Procedures Design
New York, New York

Feb. 15-17

IRE, Internal Solid State Circuits Conf., University of
Pennsylvania and Sheraton Hotel,
Philadelphia, Pa.

Feb. 16

British Institute of Management
Connaught Rooms,
Great Queen St.,
London WC 2, England

Feb. 23-24

NMAA Division 6 Conference
Ben. Franklin Hotel,
Philadelphia, Pa.
Contact: Calvin Elliot, NMAA,
1750 W. Central Road,
Mt. Prospect, Ill.

Feb. 27-March 2

Office Management Assn. of Chicago Annual Seminar and Exhibit
Conrad Hilton Hotel,
Chicago, Ill.
Contact: George A. Roubik,
OMA of Chicago,
105 W. Madison St.,
Chicago 2, Ill.

March 6-8

American Management Association Data Processing Conference
Statler Hilton Hotel
New York, N. Y.

March 16-22

Society of Savings and Loan Controllers Annual Meeting
St. Francis Hotel,
San Francisco, Calif.
Contact: Mr. Charles Borsom,
221 N. LaSalle, Chicago, Ill.

March 27-31

Symposium on Temperature—Its Measurement and Control in Science and Industry
Sponsored by ISA, American Institute of Physics, National Bureau of Standards
Veterans Memorial Auditorium,
Columbus, Ohio

April 4-6

National Microfilm Association 10th Annual Meeting and Convention
Sherman Hotel
Chicago, Illinois

April 17-19

Seventh National ISA Symposium on Instrumental Methods of Analysis
Shamrock-Hilton Hotel
Houston, Texas

■ ■ ■

Notable Quotes

"I think it is fair to say that electronic computation takes at least one long step ahead that is unique among all the great inventions. The technological advances of the past have been important because they extended man's physical ability to get things done. The computers for the first time materially increase the productivity of man's intellect." Walter W. Finke, president, Honeywell EDP Division, in a speech to the Minneapolis Chamber of Commerce.

"Use of integrated and electronic data processing presents another possibility for reducing clerical costs. Any one engaged in procedure work or in supervision should learn all he can about this new type of equipment so that he can evaluate its possibilities. The mere fact that his company is medium-size does not shut off the possibilities of integrated data processing." William J. Jacquette, "Clerical Cost Control," *Office Executive*, November, 1960.

"Dr. Dichter [Ernest Dichter, Motivational Research, Inc.] found the real reasons you don't buy a computer are very different. You're not sure it will be a profitable investment and if it turns out to be a bad decision, you are afraid of losing your job. You're even more afraid that the machine will replace you or at least reduce your status in the company. And you're worried the machine will be too much for you — too complicated to run or even understand. Some men care what happens to their fellow employees, too; will they lose their jobs, too?

"A lack of computer information makes it easy for these fears to control your actions. And in many cases you're not even aware of these hidden fears. Dr. Dichter says two factors have contributed to your dilemma. The arrogant attitude of computer salesmen makes you uncomfortable and fearful. They talk a language full of new terms and names. The other factor stems from the manufacturers' advertising. It hasn't been directed to you. It has been for some mythical power that buys computers." Editor's Notebook, *Modern Office*, November, 1960. ■

OUTPUTS

ITEMS OF INTEREST FROM HERE AND THERE

PROFITABILITY SEMINAR

An unusual aspect of accounting was disclosed at the Profitability Seminar, held in Detroit in November, which was sponsored by the Detroit Research Institute. Maintaining that the usual accounting methods were obsolete, that they had been devised to simply inform outside capital of the status of their investment, Donald W. Jennings of Touche, Ross, Bailey & Smart's Detroit office, took the conferees on the start of three days of intensive investigation of possible systems.

Profitability accounting must be tailored for each company, only its concepts are general. It is designed to turn out the type of data that can give management direction for decisions for the future, not simply historical documents.

Other speakers included: Dr. R. Lee Brummet, University of Michigan School of Business Administration; Dr. Robert G. Stevens, Touche, Ross, Bailey & Smart; Frank P. Coyer, Jr., controller, Kelsey Hayes Co.; and Donald J. Trawicki, Touche, Ross, Bailey & Smart's Milwaukee office.

KAISER CENTER

The new Kaiser Center in Oakland, California, is the newest commercial data processing center in the west. It utilizes two Remington Rand Univac Solid-State computers, one with magnetic tape.

The Center provides the 60 affiliated Kaiser companies with facilities to process their wide range of computing requirements.

SPACE COMMUNICATIONS

Philco Corporation has asked for the adoption of a system by which international space communications would be provided and operated by the United Nations. This is felt to be a major step toward global peace and understanding, thus strengthening the United Nations.

CREDIT CARD ECONOMY

A universal and automated credit card system would eliminate the exchange of cash, checks, money orders, invoices, receipts and other paper. This could be a practical possibility in the next decade with only slight improvements to existing equipment, according to Neal Dean, a specialist in management information systems. Mr. Dean is one of six top experts who participated in a round table discussion held in Los Angeles recently on *The Effects of Business Automation on American Industry in the Sixties.*

LAB EXPANSION

The Western Development Laboratories at Palo Alto, California is undergoing a five million dollar building expansion program, it was announced by Philco Corporation.

NATIONAL 304 USERS

A National 304 Users' Organization has been formed to provide communication and exchange information of mutual interest. Experience and techniques in systems analysis and formulation, programming, and operation will be profitably shared for the benefit of all using the system. The initial meeting included 17 commercial and government users and four data processing centers.

FIRST 7090 IN NEW YORK CITY

Union Carbide Corporation is installing an IBM 7090 data processing system and will thus have the most powerful computer in commercial use in New York City. The 7090 will be used to solve research, development and engineering problems for Union's 400 plants and research facilities throughout the country. It will also be used for data processing to aid management.

M. I. T.

The Massachusetts Institute of Technology reports that after three years of operation of the Computation Center more than 2,000 students and faculty members of 32 New England colleges and universities have learned computer use. In this three years' period, slightly more than one thousand different problems were run on the IBM 704. Use of the computer doubled in that time and usage would have increased still more if the computer were not already used around the clock. Several new languages were devised, including COMIT, LISP, DYNAMO.

* * *

Instrumentation Laboratory at M. I. T. is planning to install a Honeywell 800 electronic data processing system for high-speed analysis and simulation of guidance systems in the missile field. Although most of

(continued on next page)

The console of an IBM 7090 computer, first of its kind delivered to a customer in New York City, was moved into place recently in Union Carbide Corporation's new world headquarters building.

the scientific work on the computer will be in connection with Air Force projects, the system also will be available to other branches of M.I.T. for training and educational purposes.

WATTS EXPANSION

Watts Business Forms has a new plant at Dillsburg, Pennsylvania, to produce multiple part carbon interleaved business forms. It supplements existing plants in New York and New Jersey.

DETROIT'S BUSINESS SHOW

Detroit will hold a business show at its gigantic new Cobo Hall, May 2, 3, and 4th. This will give the 1961 show plenty of space; three times the space used in the 1960 show will be utilized, with double the number of previous exhibitors expected.

DATA PROCESSING CENTER

Collins Radio Company has formed a division to provide data processing services to industry. The new division will offer subscribers direct access to an "on-line-real-time" data processing service not presently available to industry.

This new Communication and Data Processing Division will integrate research, products, experience, and systems management capabilities of all Collins divisions and subsidiaries. The system's first link — Collin's subsidiary plant at Toronto with the Central Data Processing Center at Cedar Rapids, Iowa, is in operation. Additional links will be made with stations at Los Angeles, Dallas, Washington, New York and Kansas City. Traffic from subscriber stations will be transmitted to and from the center by wire line using Kineplex.

DIGITRONICS

The Digitronics Corporation moved into a modern manufacturing plant in Albertson, L. I., New York, designed and built for the company, which more than triples previous facilities.

BANK SYSTEM

The Republic National Bank of Dallas has a totally automated electronic check handling and posting system using its RAMAC 650. ■

Direct Input Methods

(continued from page 26)

is developed which can print magnetic characters of good definition. Such a development would open the door for building procedures around the use of magnetic ink for documents which circulate to customers, and are returned to reenter the system.

Magnetic ink character recognition is more tightly controlled than optical scanning. Its reject rate is lower and its speed of recognition is faster. However, optical scanning techniques appear to have greater prospects and opportunity for more universal application than MICR. Of course, optical scanning has its own peculiar sets of advantages and limitations. Its projection for the future seems to be one of boundless opportunity. Next month we'll discuss optical scanning, analyze its characteristics, and draw some conclusions regarding automatic input possibilities for the future.

(The concluding article of this two-part series will appear in next month's issue.) ■

Give Your New Employee a Break . . .

(continued from page 28)

its objectives. He hadn't introduced Bill to the functions and aims of the company or department. He hadn't treated Bill as an individual with individual doubts, hopes and aspirations. He hadn't taken the trouble to determine how he was doing from his own point of view, whether or not he was happy with the job.

Most important of all he hadn't realized that a new employee requires even more attention than the veteran. He needs the vital sense of belonging, of importance, to overcome all his initial human apprehensions and doubts.

Instinctively the manager knew that it would be data processing suicide to ignore the key role played by systems and equipment. He hadn't realized though that it is even more damaging to ignore the role that is played by people. ■

DATA . . . yours for the asking

For your convenience in obtaining pertinent and helpful information on the latest equipment, forms, services and related products in the data processing field, we direct your attention to the following free literature available from the manufacturers. Circle the numbers pertaining to the literature you wish to receive on the Reader Service Card appearing elsewhere in "DP."

MAGNE-TAB INFORMATION is now available in an informative circular which details how the magnetic card operates and its place in automatic record keeping procedures. Magne-Tabs have a built-in magnetic action which causes the cards to repel each other at the touch of a finger. Twenty or more of the cards fan out automatically in the file trays, enabling operators to pick cards rapidly.

Circle No. 70 on reader service card.

PAPERVEYOR, AN OVERHEAD PAPER HANDLING system applicable in any office or warehousing situation, has been developed by the Chainveyor Corporation. All papers can be dispatched to any sequence of locations and automatically unloaded at preselected stations anywhere in the office.

Circle No. 71 on reader service card.

MONOFLO is an automatic paper handling system for transferring complete files and books via a rotating cable conveyor and three types of paper carriers. The conveyor can be installed alongside desks or suspended from the ceiling.

Circle No. 72 on reader service card.

CONVEYORIZED HANDLING PRINCIPLES and their application to the movement of paperwork in departmental and interdepartmental operations are described in a booklet now available from Mercury Industries, Inc. The booklet details the Mercury Office Conveyor system.

Circle No. 73 on reader service card.

GRAPH SHEETS and their special uses are listed in a new catalog published by Keuffel & Esser Co. The 92 page booklet includes illustrations of graph sheets and in the descriptive text, an introductory guide to the selection of grid patterns best suited to individual requirements.

Circle No. 74 on reader service card.

CODE CONVERTER features are highlighted in a new Friden, Inc. booklet. The communications machine is designed to integrate data processing when two different tape code systems are used by converting any five, six, seven, or eight channel system one to the other.

Circle No. 75 on reader service card.

DUAL TELEDATA TAPE TRANSMITTER-RECEIVER advantages are depicted in a new ten page booklet from Friden, Inc. The booklet has a full front view of the transmitter-receiver chassis, tone units, tone unit with cover removed, and rear view. Transmission channel requirements for operations in either half or full duplex systems are explained, as are the error detecting double parity check system and the interlocking system.

Circle No. 76 on reader service card.

SOLID STATE DISPLAY ASSEMBLY, Model 2060, is described in a bulletin released by Hermes Electronic Co., a division of Itek Corporation. This new unit is designed for application in any system requiring presentation in decimal display of a binary coded decimal parallel signal.

Circle No. 77 on reader service card.

AUTOMATION CENTER SERVICE is the subject of a 12-page brochure which describes the electronic data processing service of the McDonnell Automation Center. The McDonnell Aircraft Corporation brochure describes data processing services in both the scientific and administrative areas, systems design, programming, computing, tabulating, consulting and training of client personnel.

Circle No. 78 on reader service card. ■

Seen in Print

THE MANAGER AND THE BLACK BOX, by Melvin Anshen, Harvard Business Review, November-December, 1960.

The author believes the new decision technology has a potential for enriching rather than shrinking the role of executives, at the middle as well as at the top. He discusses these questions:

How broadly will the new mathematical techniques spread across the decision-making functions of management?

Will they become major factors in five, ten years?

Will computerized decision-making end or reverse the trend to decentralization?

How should organizational structures be changed to best provide for these new procedures?

What are the implications of the new techniques for managerial functions, the relations of line and staff personnel, the training and growth of future executives?

Will the technical specialist dominate the administrative world in the foreseeable future?

MACHINE READING, Data Processing (English quarterly), October-December, 1960.

A survey of the printed codes that can be read directly by both men and machines and of the reading machines developed. Several codes which can be read by humans and machines have been designed to overcome the slower punched card methods. This article discusses the E-13B magnetic ink character recognition code adopted by the American Bankers Association. It also examines in detail the Fred code developed in England and the C.M.B., developed by Bull, and the machines designed to read them. The English banks are soon to choose one of the three codes for their own checks.

TODAY'S TRENDS IN OFFICE TECHNOLOGY, by Thomas Kenny, Dun's Review and Modern Industry, September, 1960.

Technology is bringing changes in office operations. To get the best results from the new equipment management must review the way paperwork is processed. There are more changes coming into the office: large wall size or desk mounted television screens for instantaneous data retrieval, typewriters that take dictation directly, desk-top adding machines operating on an optical scanning principle to do the job automatically, executive phones with television for conferences which will eliminate much of the need for travel, and quieter and more compact accounting machines.

MINIATURIZATION: GOAL AND BY PRODUCT by Theodore Berland, Industrial Research, August/September, 1960.

Requirements for tiny components, circuits, and systems are causing a revolution in design and techniques. Begun by the military demands for aircraft and missiles, miniaturization is having an impact on industrial products, particularly in electronics. New materials, fabrication techniques, and manufacturing standards are by products, electronic products from hearing aids to computers are shrinking in size.

MANAGEMENT GAMES—TOY OR TREND? by Robert M. Smith, Office Management and American Business, September, 1960.

Although the military have always used simulation for war games, the use of games for decision making as an aid to training executives is fairly new, and more companies are employing this method. Games can be played with or without the aid of computers. The more sophisticated use computers to evaluate all interacting factors and determine what decision outcomes will be. ■

BOOK SHELF

DOCUMENTATION and INFORMATION RETRIEVAL by J. W. Perry and Allen Kent, Press of Western Reserve University and Interscience Publishers, Inc., Western Reserve University, Cleveland 6, Ohio, 156 pages.

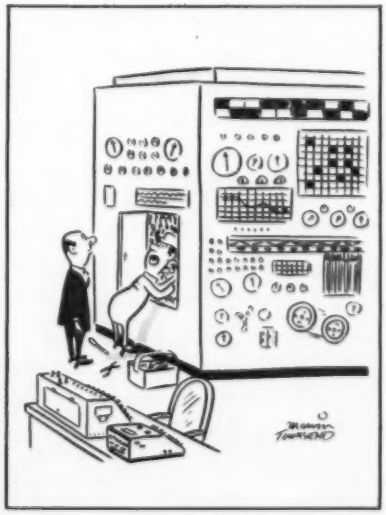
This book concerns documentation and information retrieval, an introduction into the basic principles and cost analysis through use of mathematical models. In science and technology so much material is being published that it is almost impossible to keep track of it without development of new methods and techniques. The techniques of librarianship—its systems, its mechanisms, its corpus of practice—may have outdistanced its fundamental theory. The poverty of innovation that now characterizes librarianship makes evident that need for reexamination of fundamental principles which underlie men's use of recorded knowledge.

The authors are engineers by training and experience, documentalists, library researchers and educators by choice. They have spent years pioneering in the development of mechanized systems for searching and correlating the literature which is the background for the basic analysis of this book.

THE MODERN PROGRAMMER by Charles O. Reynolds. Pyramid Publishing Co., P. O. Box 4394, Philadelphia 8, Pa., 1960, 164 pages, $4.50.

The author covers the requirements of a good programmer who must be idea man, diplomat, manager, trainer, human relations expert, and salesman, as well as continuous producer of new programs. Also included in the volume are instructions on preparing a program, block diagramming, punched card equipment and its uses, and the Ramac 305. There are chapters on getting ready for an installation, problems and answers for Ramac programming, and a look into the future of the programmer. ■

INDEX TO ADVERTISERS



"IT HAS AN ULCER"

editorial

BASIC PRINCIPLES OF OPERATION suggested by the analyst in conducting a feasibility study are applicable not only to a proposed automatic data processing system, but to the punched card installation as well. Alert management in a company using punched card equipment find to their great satisfaction that improved operational effectiveness will result by using one of the most important factors proposed by the analyst — "Management by Exception." This principle is well known to the users of automatic data processing and need not be reiterated here, however, to the user of electronic data processing equipment and, more specifically, to the punched card user many of the advantages of this principle can be realized.

Automatic data processing can produce complete records for reference, audit and record. However, whenever possible, management reports should contain only those items of information which vary significantly from the normal and require the attention of management.

To apply this principle to the punched card operation is a challenge to the alert punched card supervisor. There is no reason why at this point punched card users should not take a leaf from the computer user's notebook and adapt this method now so successfully applied by the computer exponent.

It is entirely feasible that with the use of high speed sorting devices coupled with a collator, the same principle of management by exception could be employed. Certainly the comparison of common or equal information and the matching of this information against established limits as determined by management could be very easily accomplished. This would result in the use of only a relatively small number of cards in the preparation of the final reports for management.

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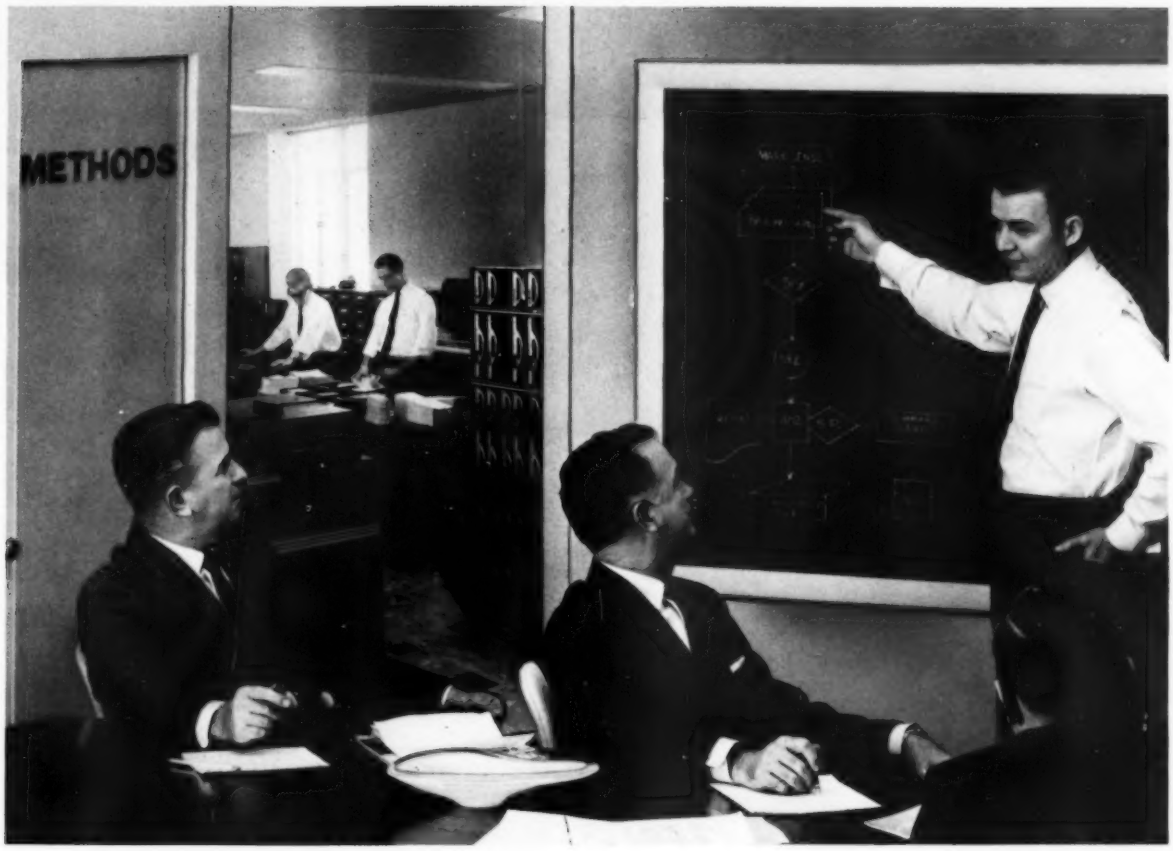

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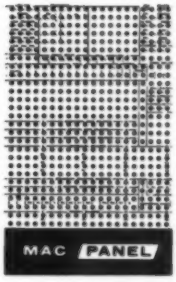

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